FORESTRY ABSTRACTS

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THE USE OF AIRCRAFT IN FOREST INSECT CONTROL

PART III

6. ASSESSMENT OF RESULTS

Careful assessments of the results of aerial applications of insecticides to forests are necessary if the method is to be used wisely and its potentialities developed. Such assessments require quantitative ecological studies of both short- and long-term effects on (1) insect populations, including the pest and associated beneficial or destructive species, (2) the forest stand, and (3) fish and wildlife. A knowledge of total biological effects is a pre-requisite to sound judgment of the economic values.

Studies of immediate results by measuring the reduction of pest populations attributable to the insecticide are chiefly of value in determining the efficacy of the toxicant at the dosage used, and the effects of timing, weather, and techniques of application. Ultimate results can best be determined by long-term studies of the whole ecosystem, and these should be commenced before the treatment and continued as long as the outbreak lasts or measurable effects remain. In both cases, difficulties are commonly experienced owing to the large and variable forest areas usually involved, the shortage of available staff for large-scale investigations and the frequent inability to obtain adequately comparable unsprayed areas as controls.

Most of the references in the literature are to studies of immediate results, limited to estimates of % mortality of the pest immediately following treatment and sometimes supported by subsequent observation of the condition of the trees. Although many of the biological effects of DDT and other insecticides have been described, no exhaustive investigations of all the results of full-scale control projects have yet been reported. The following review of methods and results of recent investigations will indicate the nature of the problem.

(A) EFFECTS ON THE PEST AND ASSOCIATED INSECT POPULATIONS

The first question to be answered concerns the direct effects on the generation of the pest that is treated. What % of the population is killed? How does this compare with mortality that would otherwise have occurred through natural causes? The most acceptable method is to estimate the populations before and after spraying and to compare them with similar estimates from an untreated stand of the same type having the same history and intensity of infestation. Unfortunately, however, comparable check areas are not always available and 'percentage control' is sometimes calculated from the drop in population observed between pre- and post-spray samples, as in Table II. While such figures are useful, they are subject to the limitation that they represent mortality from both natural and artificial causes. Serious misinformation might result if there were a rapid population decline from natural causes during the late larval stage when control measures are customarily applied [85, 112, 157]. If, however, an unsprayed area is sampled simultaneously and found to be similar as to population density and natural control, the difference in the numbers of survivors after spraying may be used to calculate the mortality due to the insecticide alone. If there is a substantial difference in initial populations on treated and untreated areas, Abbott's formula[1] is commonly applied. The correction is theoretically valid, however, only if it can be assumed that the natural mortality % is identical in both populations—a condition not often to be relied on [24, 140, 161].

It should be noted that the value of the treatment in protecting the trees is not necessarily proportional to the numbers of the insect killed that would not otherwise have died. Treatments applied early enough to kill larvae before they have done much damage are likely to give more protection than later spraying against populations already reduced by natural factors. In this respect, therefore, the actual % killed may more closely represent the degree of protection obtained than the difference in numbers of survivors at the end of the feeding period.

The time at which surviving populations are measured is important. Counts made immediately after poisoning has taken effect will give the best estimate of direct mortality due to the insecticide

[1] Per cent mortality from treatment $= 100\,(x-y)/x$, where x = % survival in the untreated population and y = % survival in the treated population.

alone. Measurement near the end of the generation, in the pupal or adult stage, will also include indirect effects attributable to interactions between natural and artificial control subsequent to spraying. If the application results in a greater % reduction of the pest than of its parasites and predators, natural control in the post-spray period may be proportionately greater in sprayed areas. Preliminary studies suggest that this may have been the case with the Spruce budworm [11, 49], but whether such a result will be lasting depends on the host-density relationships of the parasites. On the other hand, the early reduction of large pest populations may have an adverse effect on the more clearly density-dependent factors of starvation and disease, resulting in the survival of numbers of the pest that would otherwise have been killed by these factors. Thus indirect effects may have either a positive or negative value and may contribute appreciably to the degree of ultimate survival. Measurement later than the adult stage will, of course, include the effect of any invasion by adults from other areas.

The concept of mutual interference of control factors has been discussed in a description of the life-table method of studying population trends [112]. The importance of method in calculating 'percentage control' by applied measures is illustrated by an example from field data. (i) Of an initial population of 190 larvae per sampling unit, 112 survived on the unsprayed plot and 29 on the sprayed plot. Thus an 85% reduction occurred on the sprayed plot between pre- and post-spray samples, most or all of which can probably be attributed to the early action of the insecticide. (ii) Comparison of surviving populations, either directly or by Abbott's formula, indicates that the direct and indirect effects reduced survival by 74%. (iii) For life-table purposes, however, calculations must be based on initial populations as in the manner conventionally adopted in expressing percentage parasitization. This results in a figure of 100 $(112-29)/190 = 44\%$ mortality for DDT. Each figure is valid if properly interpreted. The first is useful as an indication of the probable effectiveness of the spray in reducing damage but overestimates the role of the insecticide as compared with natural control; the second gives a clear indication of the ultimate reduction in numbers of the current generation but may underestimate the effect of killing larvae early in the feeding period; the third is the best indication of the place of spray mortality in determining population trends but gives no consideration to results in terms of tree protection.

The total long-term effects can only be determined by studies of subsequent generations, and these must be continued until endemic conditions obtain on both sprayed and unsprayed areas. Essentially, the problem is one of determining the impact of the new factor of applied control on the population ecology of the pest and associated species. The interrelations of the different populations and the reciprocal effects of many of the control factors are far from simple and only some of the more obvious ones are likely to be measured with any accuracy [119]. The reduction of the pest will affect the density-dependent factors such as parasites, predators, disease, and starvation. General insecticides such as DDT will kill some parasitic and predacious insects, the number depending on dosage and timing in relation to the habits of the various species. There will also be indirect mortality of these beneficial insects due to the killing of their hosts. The importance of this effect on the natural control complex will depend on the searching ability of the species concerned and may be assessed by measuring the changes in % parasitization or predation.

A complete study should aim at the preparation of life tables to measure absolute population trends and assess the influence of the major factors of control [112]. Methods will vary with the habits of the insect and the intensity of the study, but in all cases sound techniques of sampling are essential [111]. These will usually involve counting the numbers of the pest on a representative unit of the tree crown or forest floor and classifying the individual insects by stage and condition. By proper timing of sampling, percentages of parasitization, predation, and mortality from other causes may be estimated simultaneously with the pest population. Since the forest itself is a variable, life tables for each generation should be obtained from important stand types.

Methods of sampling used in connexion with biological assessment vary according to the habits of the insect, the nature of population distribution, and the intensity of the study. Several methods used in studying the effects of DDT applications against gipsy moth on different insects have been described [79, 82]. "Arboreal species were captured on sheets under the trees by tree jarring, and also in cloth-bottom trays placed on the ground to catch affected insects as they fell. Flying insects were captured in light traps, fly traps, box area traps, and on boards covered with an adhesive. Certain ground species were taken in traps baited with fish or molasses, and in modified Berlese funnels. Sweep net collections and general observations furnished data on other species. Insect populations in streams were measured by means of a square foot sampler."

Frass-drop measurement has been used with the gipsy moth in Jugoslavia [142], the Pine looper in Sweden and Germany [37, 128, 136], the nun moth in Germany [163], and the Hemlock looper in

British Columbia [129, 130]. It gives only an estimate of feeding and has limited application with such species as the Spruce budworm [111].

Direct sampling of living insects has been employed with the Spruce budworm. In most cases foliage samples are taken from the mid-crown with the aid of long-handled pole pruners equipped with baskets. In experimental studies in Ontario, populations were expressed in terms of the number of larvae per 100 shoots of the current year at the branch ends [63, 144]. In the U.S.A., the customary unit has been a 15-in. branch tip [50, 155, 166] and in Canada either 18-in. branch-tips or whole branches. The use of whole branches from representative sections of the crown permits the expression of populations in absolute terms such as numbers per unit area of branch surface and has advantages for life-table studies [112, 124]. In Oregon, sampling was done just before spraying and approximately 10 days after, the % reduction being used as the measure of control [165, 166]. In New Brunswick, permanent plots have been sampled twice-weekly throughout the larval and pupal period and the population trends compared on sprayed and unsprayed areas. For more extensive study, samples have been taken less frequently, at times favourable to the assessment of parasitization as well as host population, or only once after spraying [24, 160].

The 'larval-drop' method has also been used with the Spruce budworm. Mats or trays are placed beneath typical trees and their area is calculated in relation to the periphery of the crown. The larvae dropping on them are counted daily. After dropping ceases the trees are cut and examined for dead and living larvae. The initial population is estimated and % mortality corrected for natural control by similar sampling in unsprayed areas [42, 49, 113, 157]. Insect drop per unit area has been used in Czechoslovakia with *Dendrolimus pini* L. [93], in France and Germany with cockchafers [71, 151], and in Canada with Hemlock looper and Spruce budworm [130, 144]. The method has the disadvantage that it fails to provide data on population trends suitable for long-term studies.

The effectiveness of an operation may also be judged by sampling the population of the generation following treatment. This indicates the amount of reinfestation from surviving adults, and of adults or larvae drifting into the area from outside. Moth traps baited with an extract of the sex glands of the female have been used extensively in the U.S.A. to estimate male gipsy moth numbers [39]. Spruce budworm operations in the northern Rocky Mountain area of the U.S.A. were assessed in 1953 largely by estimating the numbers of overwintering larvae emerging from branches brought into the laboratory [48]. Egg sampling surveys based on the number of eggs per unit of branch area have been used in Canada to assess the effects of spraying, as well as to determine the areas needing spraying the following year [24, 110, 130]. Soil samples were taken to determine larval populations in the generation following spraying against cockchafers in Europe [71, 151].

The literature contains few references to long-term studies of aerial forest spraying. Among the more complete are those by Hoffmann *et al.* [79, 80, 82], who reported on some of the effects of DDT on forest invertebrates. These varied with dosage, size of area, and the habits of the various species. Dosages as low as 1 lb./acre caused tremendous reductions in most species that were exposed to contact with the insecticide at the time of treatment. Exceptions were some hairy larvae, ants, large moths, and bees. "General conclusions indicated by the work to date are that a single airplane application of DDT to a forest at the rate of 1 lb./acre—enough to control many forest pests—does not seriously damage the general arthropod fauna, although a few species would probably be exterminated by a thorough application at this rate. An application of 5 lb. DDT/acre threatens near exterminations of many harmless and beneficial species, and may result in harm to the forest through encouragement of aphid and mite outbreaks. DDT used at moderately light dosages will tend to restrict the range and abundance of many harmless and beneficial species, and its widespread use on forests threatens extermination of some of the more susceptible and sedentary species. However, even with a dosage of 5 lb. of DDT per acre, the effect on the arthropod fauna as a whole is far from being calamitous" [82].

(B) EFFECTS ON THE FOREST

The effects on insect populations will be reflected in the effects on the forest and it is the latter that will be of chief interest to the forest officer responsible for management. The value of an operation will be judged by the amount of protection given to the trees and the ultimate silvicultural and economic results. This calls for measurements of defoliation, growth, and mortality, preferably on both treated and untreated areas. Such studies are also an integral part of research on the ecological results of the use of insecticides and the techniques of application.

Estimates of degrees of defoliation provide an indirect measure of the immediate reduction of pest populations, as well as the amount of protection given to the trees. They may be the only practicable

means of determining results over large areas, and both aerial and ground surveys have been used for this purpose [160]. Methods of estimation will vary with the species of insect and tree. Defoliation of standing trees has been estimated from the ground with the aid of field glasses. More precise appraisal may call for detailed foliage analysis of sample branches, a procedure that may be conveniently carried out at the same time as the sampling of the insect population [62, 144, 161].

A knowledge of the tolerance of the tree to various degrees of damage is necessary to the correct assessment of the value of protection as well as its proper timing. Most deciduous species will survive 2 or more years of complete defoliation, whereas most conifers will be killed by loss of all their foliage. The effect of defoliation on radial growth rate may not be apparent for a year or longer after the initial attack, and ultimate death may not occur for several years. Likewise, recovery of the growth rate and assurance that the tree will not die may not be apparent for several years after an outbreak has subsided [27]. The damage to the tree will seldom be directly proportional to the % of defoliation. It will depend on the insect's habits, on the time of feeding, on the preference for old or new foliage, on the injury to buds and shoots, and on the vigour of the tree. The preservation of a relatively small % of the foliage or shoots may make a disproportionately large difference in the capacity of the tree to repair the damage. More studies of the physiological effects of defoliation are needed.

Many references in the literature report high larval mortality from treatment and infer successful results but lack quantitative data on the actual protection afforded. Wellenstein [163] and Trägårdh [153] recognized the necessity of basing final evaluations on the degree of timber protection. The former calculated that nun-moth operations in East Prussia were 80% effective by comparing the volumes of surviving timber on treated and untreated areas. Studies of Spruce budworm operations in Canada have usually included estimates of both the % of foliage preservation and larval mortality in sprayed and unsprayed areas [24, 43, 144]. Preliminary reports cite defoliation %s in relation to the reduction in larval populations and timing of spraying, and one attempt has been made to express the combined effectiveness of foliage protection and larval mortality as a single datum [159]. Long-term studies of growth and survival are in progress, and results to date indicate that widespread mortality of Balsam Fir has been averted and recovery of foliage growth on sprayed areas has been accompanied by a checking or reversal of the downward trend of wood growth. Reports of the Oregon operations assert that general killing of trees has been largely prevented and "the recovery of defoliated trees following spraying has been remarkable and clearly proves the beneficial effects of the control program" [11].

The value of foliage protection to the biological complex has been noted by Hoffmann and Linduska [79]. In spite of high insect mortality from spraying against gipsy moth, protected stands eventually supported larger faunal populations than unsprayed stands which suffered from exposure and drought owing to severe defoliation.

(C) EFFECTS ON VERTEBRATES

The effects of insecticides on forest vertebrates have been reviewed by Brown [33]. In general, warm-blooded animals are not very susceptible to poisoning at doses adequate for insect control, but fish, reptiles, and amphibians are more easily killed. As with insects, interference with food chains may result in important alterations in the balance of populations, but these will not necessarily be permanent or detrimental and may be less serious than those that would result from destruction of the trees.

Mammals. Arsenicals are very toxic to mammals, and their use has been considered undesirable for this reason [33, 137] but Trägårdh failed to find evidence of serious results from dusting forests with Ca arsenate at moderate doses [153]. DDT is less toxic and the upper safe limit has been estimated at about 5 lb./acre, well above the dosage usually recommended for forest insects [79].

Insectivorous or aquatic animals may suffer from reduction of their food supply. These effects are difficult to measure but studies to date tend to discount them. Mouse and shrew populations did not appear to suffer greatly from one or more applications of DDT at doses up to 6 lb. per acre [40, 102, 143, 145]. In mosquito control, 17 weekly applications of 0·1 lb./acre did not affect raccoons, cotton rats, or cottontail rabbits [58]. Population changes may result from emigration and raccoons were noticed to move in search of other food after heavy mortality to crayfish, their staple diet [79].

Birds. Laboratory tests show that birds are affected by smaller quantities of DDT ingested with their food than mammals [33]. As with mammals, however, there is little evidence to date of serious reductions in either nestling or adult bird populations following single applications of moderate doses [40, 58, 79, 95, 143]. Annual applications at 2 lb./acre for 5 successive years have been followed

by a 26% drop in breeding populations, although only 3 species appeared to be affected [131]. The most serious danger appears to be from heavy doses of 5 lb./acre or more applied during the nesting season when birds are confined to their territories [79].

Other insecticides used do not seem to be more damaging than DDT. Trägårdh [153] and Krieg [98] discount the threat of Ca arsenate at moderate doses. Chlordane and aldrin used for grasshopper control caused no measurable effects [57].

Fish. Most insecticides are toxic to fish and fish-food organisms. The use of rotenone and derris for piscicidal purposes is well known. DDT and chlorinated hydrocarbons are likely to cause serious direct mortality at dosages of < 1 p.p.m. Organic phosphates may be even more toxic, while normal doses of arsenicals appear to be relatively harmless. It has been suggested that the over-all biological effects of DDT are greater on aquatic than terrestrial fauna because of the former's intimate and continuous contact with the poison [78]. Measurement of direct mortality has been attempted by a variety of methods. Population counts of given stream areas may be done by seining or the use of electric shock [96]. Observations have been made of survival of known numbers of fish in live box traps placed in sprayed and unsprayed waters [40, 79, 96, 99]. Frequent references are found to the observation of dead and dying fish along lake and stream banks or at weirs [40, 79, 99]. Measurements of effects on fish-food organisms and other aquatics are commonly made by pre- and post-spray drift counts at weirs and by population counts using devices such as the 'square-foot sampler' [78].

Poisoning may result from (i) direct contact with aqueous oil emulsions or fine particule suspensions such as may result when formulations are deposited on fast-moving water; (ii) contact with the surface film of oil formulations; or (iii) ingestion of contaminated food [99]. A number of factors may vary the degree of damage resulting from aerial applications of given dosages. DDT solutions are less toxic than emulsions and more so than suspensions. The amount of poison entering streams is governed by the density of the forest canopy and the evenness of the application. Young fish are more susceptible than old, and general forage species more than game fish. The degree of toxicity increases with water temperature and clarity [33, 78, 79, 146] and residual effects may last for a month or more after spraying, owing to the accumulation of poison particles on stream plants. This accumulation increases in importance downstream and may produce damaging results several miles below the source of the poison [33, 78].

There is clear evidence, in the literature, of the hazards to fish of applications of DDT in excess of 1 lb./acre [40, 79, 99, 146]. Mortality may also be expected at dosages lower than this, but with careful application, the results are frequently negligible in terms of total fish populations. Brown [33] concludes that applications of 1 lb./acre "can be practised without undue hazard to trout fishing, provided the dosage is evenly applied". Roegner-Aust [133] suggests that large-scale applications of Gesarol do little direct harm to the fish but that damage may result from killing their natural foods. Preliminary results of studies of Atlantic salmon populations in the New Brunswick sprayed area (½ lb./acre) are less reassuring. Counts made several weeks after spraying showed fingerlings to be absent and 2- to 3-year-old parr seriously reduced from the previous year's figures [96].

Positive evidence has also been provided by several workers of severe reductions in fish-food organisms [12, 40, 134]. Intensive studies have indicated negligible fish mortality but 70 to 90% reduction of fish-food organisms from dosages of 1 lb. DDT/acre against gipsy moth [78]. Most of the staple fish-food species were affected, including both free-swimming and bottom inhabitants. Among the insects, Culicidae and Simuliidae are regarded as the most susceptible [33], followed by Ephemeroptera, Plecoptera, Chironomidae and most Trichoptera. Crayfish are particularly susceptible. Trout have been observed to feed on paralysed crayfish, following drastic reductions of aquatic insects from spraying [12]; the effects, however, seem to have been temporary. Some groups such as Odonata and Megaloptera are relatively resistant and others, notably certain midges and mayflies, have shown remarkable ability to repopulate affected streams. A definite trend toward recovery of aquatic insect populations 2 to 3 months after treatment has been noted and populations in the following spring equalled or exceeded pre-spray numbers, although the generic complex was changed, suggesting that there is "a multiplicity of interrelated factors which prevent any but transient diminution of the aquatic fauna after the application of a 1-lb. dosage of DDT to large forest areas" [78]. Work farther north points to normal populations being restored within 2 years [134].

The literature suggests that fish mortality from a single application will not be serious if overdosing is avoided. More long-term study is needed, however, of the direct and indirect effects of spraying large areas. Fortunately, an annual study of Atlantic salmon populations was in progress on two rivers in New Brunswick when they were sprayed in 1954 and it is expected that the results of the next 3 or 4 years' work will provide some much needed information on the effects of a large operation on this important game and commercial species [96].

7. CONCLUSIONS AND FUTURE DEVELOPMENTS

With the aid of aircraft and the new insecticides it is now possible to use chemical control on a large scale against many species of forest insects. The chief problems of application have been solved, although many improvements in techniques will undoubtedly be made as a result of experience and research. An aeroplane is being designed in the U.S.A. specifically for spraying or dusting crops and there will probably be refinements in equipment for the control of dosage and droplet size. Pilots experienced in low-level flying over forested areas and adapting flight lines to air movement so as to obtain good coverage are increasing in number. Research on insecticides may be expected to uncover new substances and formulations that will be more effective, or more selective in their action, than DDT. Aero-chemical control will probably be used with increasing efficiency against an increasing number of pests.

This new tool should be employed with discretion and its limitations recognized. Its chief value at present is as a means of preventing the killing of trees by defoliators. It is of value against other types of insects such as the White Pine weevil [122] and Saratoga spittle bug [101], but it is doubtful if it will ever be very effective against borers or bark beetles or species like the Balsam woolly aphid, *Adelges piceae* (Ratz.), that demand high dosages and tend to attack groups of trees rather than whole stands.

There are dangers in the indiscriminate use of insecticides that are being given increasing attention in agriculture [118], and they may have equal or greater force for forestry [22]. Exact knowledge of the effects of chemical control on insect epidemiology is limited, and its use is largely empirical. Some undesirable ecological effects have been described and it is essential to recognize the biological complexity of the control problem [141]. Outbreaks of associated species have sometimes followed spraying with non-selective insecticides, apparently as a result of destroying predators and parasites. The killing of natural enemies of the pest itself may cause a rapid increase in the residual population. Studies of the Spruce budworm to date, however, indicate that the % of parasitization has not been adversely affected, and this danger may prove more theoretical than real [11, 160]. At the same time, density-dependent mortality factors may become less effective following reduction of pest numbers by spraying. Starvation resulting from defoliation or death of the trees may be one of the major factors responsible for terminating large outbreaks, and spraying inevitably reduces the effectiveness of this factor by preserving the food supply and removing the control normally exerted by competition. Unless other forms of natural control become sufficiently effective to replace it, prolongation of an outbreak could result.

These potential dangers should not be magnified to the point of discouraging the use of aerial spraying when it is necessary to prevent serious damage. They emphasize, however, the importance of adequate ecological study of the pest and its associated species. The question of the ultimate effects on their epidemiology can only be resolved by quantitative population studies of actual full-scale control operations [22].

The possibility of the insect's developing resistance to an insecticide may also have to be considered. This has occurred in populations of some species after a number of generations have been treated. It seems unlikely to become a major problem with forest insects owing to the relative infrequency of applications, but it serves to illustrate the need for toxicological studies of new insecticides and formulations.

Before aerial spraying is undertaken, the probability of damage and the values involved must be balanced against the probability of success and the cost. It will generally be necessary to decide during the preceding year whether a spraying operation is to be organized and financed. The decision must be based on a forecast of the probable numbers of the next generation of the insect and the capacity of the trees to withstand the expected attack. This calls for close estimates of populations, natural control factors, and the condition of the stand. A thorough knowledge of the insect's habits and ecology, and sound methods of sampling are essential [111]. The value of the stand to be protected may be based on current stumpage costs but this will seldom provide an adequate estimate of the expenditure justified [19]. If, for instance, an important industry is dependent on the wood supply that is threatened, the total economic loss that would follow its destruction must be considered. Social and recreational values may be involved. The probable silvicultural effects should also be assessed. Will the damage result in a deterioration of the quality, composition, or growth of the stand—or possibly an improvement? Will it cause a serious increase in fire hazard? How will it affect future insect hazard? Studies of the history of previous outbreaks will sometimes provide definite answers to these questions [64].

The probability of success can, in the absence of adequate experience, be judged by small-scale experimental tests but these will not necessarily indicate the results of a large-scale spraying operation. Only careful studies of the total effects of actual control projects will provide the information required.

The cost of an operation is generally estimated on a per-acre basis. The acreage used may be the total area treated or the total area protected. If it is considered that the spraying will check an incipient outbreak, the acreage protected may be larger than the acreage sprayed. On the other hand, it may be necessary to include in the operation stands that are not highly susceptible to damage but would be a source of reinfestation, and the area sprayed may then be larger than the area protected. Cost should be based on the acreage protected.

The estimate should cover the costs of insecticide, flying, and organization. Insecticide costs will include solvents, diluents, formulation, and transport to airfields. Flying costs will be easily estimated when commercial contracts can be obtained; they will depend on the type of plane used, its load capacity, and ferry distance from base to airfields and from airfields to points sprayed. Both insecticide and flying costs will depend on dosage, and in large operations will tend to be directly proportional to dosage. The costs of organization will include supervision, inspection from the air or ground, construction of airfields, storage and loading facilities, roads, camps, communication, and other incidental expenses. Total costs per acre will generally decrease as the size of the area and its accessibility increase.

The cost must be considered in relation to the age of the stand and the possibility of salvage before deterioration. In general, the justification for investment in protection increases as the stand approaches maturity, provided it cannot be salvaged. Overmature stands that are not likely to be harvested before they become unmerchantable should not be sprayed unless it is necessary to protect other stands. The cost, as well as the success, of spraying will depend on accurate timing, not only in relation to the development of the insect but also in relation to the stage of the outbreak. The optimum time will vary with the species and its epidemiological characteristics, and much further study is needed before any generalizations can be made. With species, such as the Spruce budworm, that develop outbreaks over large areas, the most commonly adopted policy has been to spray in an advanced stage of the outbreak and only where it is necessary to prevent killing of trees. With species, such as the Hemlock looper, that become epidemic over definite circumscribed areas, it may be profitable to spray at the first sign of an outbreak, but the effectiveness of such attempts to 'nip an outbreak in the bud' remains to be tested.

Spraying is not a cure-all or a substitute for other methods. The ultimate objective in forest entomology is prevention or mitigation of outbreaks by silvicultural or biological means. This ideal, however, will seldom be fully realized and the development of aerial spraying has provided a means of preventing damage when other methods are ineffective. Forest management should aim at creating forests resistant to insect attack, but the extent to which this is possible, and the principles involved, are as yet only partially known [31]. Good silvicultural management will undoubtedly reduce the danger of attack from many species, particularly those that are favoured by overmaturity and large areas of pure stands. There are, however, many large natural and planted forests that are susceptible to outbreaks. To bring them into a more resistant condition will take time, even if it is possible, and the process may be delayed if they are destroyed. The Spruce budworm outbreaks in Canada, for example, create large even-aged stands that favour new outbreaks and present difficult problems in management. Unless this is prevented, the progress toward more intensive management will be delayed. Chemical control may thus be a necessary complement to silvicultural control [22].

The increasing use of the aeroplane and helicopter in forestry will result in their more frequent use for the detection of incipient outbreaks. Ground surveys with insect sampling, however, are more efficient for this purpose, and aircraft will be of chief value as an aid to transport of survey personnel and for mapping of infested areas after outbreaks develop. The latter can be done most efficiently from the air and more study is needed of techniques of observing, recording, and photographing the evidences of insect damage. The future is also likely to see greater use made of aircraft for the dissemination of parasites, predators, and disease in biological control.

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CORRIGENDA.

For. Abstr. (17) 1. p. 5, line 3: *after* Douglas C47 *read* twin-engined aeroplanes and Ford Tri-Motor. Of these . . .

p. 6, line 6: from bottom, *for* had *read* has.

p. 8, Table III, Column 1: *transpose* 1953 *to second line of column, to read* 1953 B.

(*Parts 1 and 2 of the above article appear in* For. Abstr. 16 (4) *and* 17 (1) *respectively. Reprints of the whole article* (*No. 23 of the Leading Article series*) *are available from Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England, at 5/–, post free.*)

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

Translations

See Nos. 1236, 1961, 2023, 2026, 2086, 2089, 2110–1, 2169, 2193, 2225.

0 (02). Handbooks. Manuals. Textbooks

1114. FORBES, R. D., and MEYER, A. B. **Forestry handbook**. Ronald Press Co., New York, for the Society of American Foresters. 1955. pp. 1212. Many refs. Price $15·00.

A comprehensive handbook with many tables, graphs and diagrams, and bibliographies appended to each section. The sections are as follows: forest measurements; forest management—volume tables; forest management—cutting budget and annual cut; geology and soils; silvics and silviculture; protection against fires; protection against insects and diseases; forest wildlife management; watershed management; forest range management; forest recreation (materials, structures, and facilities); utilization and wood technology; economics and finance; logging; surveying; forest road engineering; aerial photography; communications; chemistry and physics of wood; chemical and physical tables and definitions; mathematical formulas and definitions.

0 (038). Dictionaries

See No. 1262.

0 (048.1). Bibliographical Lists

See also Nos. 1299, 1691, 1960, 2355, 2358.

1115. Bibliographie. **[Bibliography.]** *Bulletin de la Société des Sciences Naturelles et Physiques du Maroc, Rabat* 34 (4), 1954 (385–410). 560 refs. [F.]

The list, compiled by the laboratories of the Institut Scientifique Chérifien, covers references of local and background interest for research on Morocco. Important omissions discovered are to be made good in 1955. The coverage includes [with some cross-reference] geophysics 16, physical geography 33, geology 73, soils 35, palaeontology 21, prehistory 20, botany 181, applied botany (including forestry) 48, zoology 27, and entomology 106 items.

1116. GRIFFITH, A. L., and STUART, B. E. ST. L. **An East African forest bibliography**. East-African Agriculture and Forestry Research Organisation, [Maguga]. 1955. pp. 118.

Covers the literature on local forestry and on that of other countries, available in East African libraries (indicated for each item). The arrangement follows the Oxford Decimal Classification and within that, is alphabetical by authors, for whom a separate index is added. This is a first edition, expecting subsequent amendment.

0 (05). Periodicals. Yearbooks. Directories. Almanacs, Calendars, Diaries

See Nos. 1902, 2197, 2315.

0 - - 010. Technique and Procedure in Research: General

1117. SPINKS, J. W. T. **Studies of special problems in agriculture and silviculture by the use of radioisotopes**. Atomic Energy of Canada Ltd., Chalk River, Ontario. No. *A.E.C.L.* No. 209, 1955. pp. 33. 71 refs. [University of Saskatchewan.]

Reviews uses in Canadian research, including soil studies, applications of fertilizers, tracing insects and other pests, and translocation. [Cf. *For. Abstr.* 17 (No. 1201).]

0 - - 011. Terminology. Nomenclature

See also Nos. 1262, 1849, 1905–7, 1924.

1118. CHU, W. **[English-Chinese forestry terminology.]** Ministry of Education, Taipei, Taiwan. 1953. pp. 156. [Chin.] I.F.B.

Gives the equivalent in Chinese characters of 7901 English terms relating to forestry, felling, wood properties, uses of wood, etc.

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. Site Factors: Climate, Situation, Soil, Hydrology (Water Conservation, Soil Conservation and Erosion)

See also No. 1865.

111. The Atmosphere. Meteorology. Climate and Microclimate

111.2. Radiation and Temperature

1119. LOGAN, K. T. **An integrating light meter for ecological research**. *Tech. Note For. Br. Can.* No. 13, 1955. pp. 4. 3 refs.

Describes an instrument built as a co-operative project by the N.R.C. and the Forestry Branch, which measures radiant energy in the visible spectrum in lumen-hours per sq. ft. It records the amount of light received on a spherical surface—an important feature, since plants utilize light from all directions.

1120. OVINGTON, J. D., and MADGWICK, H. A. I. **A comparison of light in different woodlands**. *Forestry* 28 (2), 1955 (141–6). 7 refs.

At Bedgebury a comparison has been made between the light intensities in 15 forest plots and 5 open areas during the wide range of light conditions

found in spring and summer. Light distribution under a tree canopy is extremely variable, so that it was essential to make a large number of random observations within each plot. The % of light penetrating the diverse canopies has been found to differ considerably both from plot to plot and from season to season. Some of the factors which determine the amount of light passing through the canopy and their effects on the ground flora and natural regeneration are discussed. *Authors' summary.*

111.5. Wind

See Nos. 1326, 1587, 1589.

111.7. Humidity, Evaporation. Clouds etc. Precipitation

See also section 116 and Nos. 1203, 1587, 1589.

1121. Neubauer, H. F. Beobachtungen über die Verdunstungsgrösse in Afghanistan. **[Observations on evaporation in Afghanistan.]** *Wetter und Leben, Wien* 4 (1/2), 1952 (18–24). 4 refs. [G.] L.S.

Gives, *inter alia*, evaporation maxima (absolute and mean) for various regions and sites, including the lower part of the dry-warm Oak forests (*Quercus baloot*, *Olea cuspidata* and *Dodonaea viscosa*) at ca. 1800 m. alt., in the conifer forests (*Pinus gerardiana*, *Cedrus deodara*, *Picea morinda*) at 2500–3000 m. alt., and the even higher alpine pastures of Nuristan (East Afghanistan). These maxima are only slightly less in the Oak forests than the Kabul steppe, but drop to about a third in the conifer forests. Their value as indicators for the likely success of afforestation measures is discussed.

111.8. Climatology. Climate and Microclimate

See also Nos. 1130, 1134, 1219–22, 1315–7, 1387, 1406–7, 1443, 1568, 1586, 1589, 1596, 1784, 1799.

1122. Hocker, H. W., Jr. **Climatological summaries for selected stations in or near the Southern Pine region, 1921–1950.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 56, 1955. pp. 12. 2 refs.

Data included are: monthly temperatures (average, and mean maxima and minima), monthly precipitation, number of days with precipitation $\geqslant 0{\cdot}01$ in. and $\geqslant 0{\cdot}5$ in., last and first frosts, and length of frost-free season.

1123. Franklin, T. B. **Climates in miniature. A study of micro-climate and environment.** Faber and Faber Ltd., London. 1955. pp. 137 + 8 photos. Price 15*s*.

Contains chapters on: What a micro-climate is; warmth and hibernation; cranberry marshes; soils; taking earth temperatures; what happens to the rain; nature's way; frost; air temperatures; humidity and dew; wind and shelter; light and shade; cloches and frames; micro-climates on the farm; micro-climates in the home.

1124. Aulitzky, H. Über mikroklimatische Untersuchungen an der oberen Waldgrenze zum Zwecke der Lawinenvorbeugung. **[On microclimatic studies near the timberline, from the angle of avalanche prevention.]** *Wetter und Leben, Wien* 6 (5/6), 1954 (93–9). 6 refs. [G.] L.S.

An interim report on investigations of microclimatic effects of stand borders and ground cover, and their influence on young plants, carried out on a W.N.W. slope at 1950 m. alt. in the inner Ötztal, Tyrol. On a clear September day soil temperature at a depth of 0·3 to 1 cm. rose to 56° C. on the N. edge of a clearing compared with a maximum of 16° on the shaded S. edge, air temperatures differing less. The influence of the S. edge reached about as far as its height (ca. 10 m.). The ground cover of *Callunetum* reduced soil-temperature extremes and prevented overheating.

CO_2 content of the air surrounding young plants, measured with an infra-red absorption indicator [cf. *For. Abstr.* 14 (No. 65)], was used as an index of the net assimilation rate, assumed to reach a maximum at optimum environmental conditions. For a 20-cm.-high, 11-year-old *Pinus cembra* a maximum was reached on a dull September day towards noon with a light intensity of 20,000 lux. Further increases in light intensity failed to raise the rate, as concomitant temperature increases disproportionately increased respiration. This was very marked on a clear day, showing heat damage to seedlings to be a distinct risk on such sites. [Cf. *For. Abstr.* 15 (No. 3182).]

1125. Aulitzky, H. Waldkrone, Kleinklima und Aufforstung. **[Timberline, microclimate and afforestation.]** *Zbl. ges. Forstw.* 73 (1/2), 1954 (7–12). 4 refs. [G.g.]

The author presents data on the climatic differences (daily air temperature and humidity variations and their extremes over 3 weeks in Aug.–Sept.) between a bare site and a Spruce stand of S. aspect at 1900 m. alt. near Innsbruck, in connexion with his plan for afforestation up to the timber line (mainly as a torrent- and avalanche-control measure). He concludes that nurse species are likely to help in the establishment of commercial crops, but further research is needed.

1126. Babos, I. Magyarország táji erdömüvelése. **[Forest growth regions of Hungary.]** *Erdö* 3 (10), 1954 (372–6). [Hu.]

A map showing the distribution of 50 such regions in Hungary is presented. The regions, grouped according to topography and rainfall conditions, are briefly described in respect of their potentialities as sites for particular forest species. An allocation of species in each region is offered, on the basis of a country-wide average allocation comprising 39% Oak, 16% Robinia, 16% conifers, 9% Beech, 7% Hornbeam and 4% and 9% other hardwood and softwood species respectively. [Cf. *For. Abstr.* 16 (No. 1345).]

114. Soil. Soil Science

See also No. 1568.

1127. Plaisance, G. Enigmes et pièges de la pédologie. **[Enigmas and pitfalls of soil science.]** *Rev. for. franç.* 7 (13), 1955 (909–26). [F.]

Describes and discusses some of the anomalies and deceptive phenomena that may occur in soil

structure, profiles etc., owing to geological accidents, human interference, former vegetation and crops etc.

1128. LEWIS, N. **Some notes on soil borers.** *Aust. For.* 19 (1), 1955 (42–4 + 2 photos).

Describes several methods of obtaining soil samples and the instruments used.

114.1. Soil Physics

See also Nos. 1124, 1135, 1147–8, 1151, 1155, 1167, 1172, 1589–91, 1825–6.

1129. WRIGHT, T. W. **Profile development in the sand dunes of Culbin Forest, Morayshire. I. Physical properties.** *J. Soil Sci.* 6 (2), 1955 (270–83). 19 refs.

A detailed investigation of the distribution in depth of sand-grain size, soil moisture (by gypsum blocks and 'Speedy' tester), temperature (by thermistors) and root weight; their interactions and the effects of thinning grade and ground cover, carried out in plots of natural *Ammophila* dune, under 12-, 22- and 45-year Corsican Pine, 80-year Scots Pine, 40-year *Betula pubescens*, and in a recently mobile dune thatched (4 tons/acre) with Pine branches. Trees, except for providing litter, had no measurable effect on mechanical composition but, although the moisture-holding capacity of the upper soil of the older stands was greatly increased by their organic matter, their growth dried out the sand considerably, unplanted dunes remaining comparatively moist throughout the growing season. Heavier grades of thinning tended to reduce the drying of the upper soil in the comparisons made. Brushwood thatching is an efficient method of water conservation. [Cf. *For. Abstr.* 15 (No. 3190).]

1130. KUŹNIAR, K. Kształtowanie się wilgotności gleby leśnej i uprawnej w zależności od niektórych czynników ekologicznych. **[The influence of some ecological factors on the moisture content of forest and cultivated soils.]** *Ekologia Polska, Warszawa* 2 (3), 1954 (289–322). 7 refs. [Pol.russ.e.] N.C.L.

Tabulates and graphs results of several years' investigations near Puławy [Poland]. Of 9 areas on diluvial sands, 7 were in Pine or mixed Pine forest; a further 2, and one on diluvial sandy loam, were on arable land. Air temperature and humidity, rather than precipitation, were shown to be the decisive climatic factors for moisture content. This averaged on the whole higher in forest than in arable soils. Among the former, it was highest under a Pine/Oak stand 110–120 years old and lowest under 12- to 14-year Pines.

1131. PLATER, C. V. DE. **A portable capacitance-type soil moisture meter.** *Soil Sci.* 80 (5), 1955 (391–5). 3 refs. [Commonwealth Scientific and Industrial Research Organisation, Canberra.]

Describes the apparatus, gives a circuit diagram, and explains the method of use and calibration. Though it is designed for use with a probe, a switch allows its use for the measurement of resistance with buried plaster blocks.

1132. SMIRNOV, V. N. K voprosu o vzaimosvjazi meždu produkcieĭ počvennoĭ uglekisloty i proizvoditeljnostjju lesnyh počv. **[The interrelation of CO_2 production by the soil and the productivity of forest soils.]** *Počvoved.* 1955 (6), (21–31). 20 refs. [Russ.] [Povolžskiĭ Lesotehničeskiĭ Institut im. M. Gorjkogo, Ioškar-Ola.] A.P.B.

Discusses, with tables and graphs, a selection of results from field measurements of CO_2 evolution from soils under various types of Scots Pine, Pine/Birch, Norway Spruce and Spruce/mixed hardwoods [in the Mari A.S.S.R.?]. The data include simultaneous measurements of air and soil temperature, pH and soil moisture. A direct relationship was found between rate of CO_2 evolution and increment. The former, in kg./ha./hour, varied from 0·650 for peat under *Pinetum sphagnosum* (site class V) to 1·250 for sod-podzolic sandy soil under *P. vacciniosum* (site class II) in measurements made in Sept. 1953. A sod-podzolic light clay-loam under Spruce/hardwoods (I) showed a mean for the growing season of 1·643, and a similar soil under *Piceetum hylocomiosum* (II–III) a mean of 1·185 kg. CO_2/ha./hour. Other examples are given. Data are tabulated and graphed for measurements at various times throughout the growing season. They show considerable seasonal variation; furthermore, soils under *Pinetum cladinosum* and *Piceetum hylocomiosum* showed two maxima (May and Aug./Sept.) of CO_2 evolution, whereas that under Spruce/mixed hardwoods had only one maximum (mid-July)—a fact that may be connected with the variety of both tree and subordinate vegetation in the last type. The effects are probably caused not only by seasonal variations of microbiological activity but also by variations in root activity and the movement of substances into and out of the roots. Only in certain cases was it possible to see a direct connexion with temperature, pH and moisture variations. Some data are added from laboratory tests of CO_2 production as an index of microbiological activity in (*a*) typical podzolic sandy soil (dry Pine type; site class II) and (*b*) sod-podzolic clay-loam (Spruce/hardwoods, site class I), showing physical and chemical properties as well as CO_2 production for samples from different horizons. The CO_2 production of (*b*) was 2–2½ times that of (*a*). [Cf. *For. Abstr.* 16 (No. 1349).]

1133. NORDSTRÖM, L. Något om skogstypens beroende av moränens mekaniska sammansättning i Nordsverige. **[The dependence of the forest type on the mechanical composition of morainic soils in N. Sweden.]** *Svenska SkogsvFören. Tidskr.* 52 (3), 1954 (237–54). 8 refs. [Sw.]

Detailed studies were made on two small uniform plots (50 × 40 m. and 100 × 100 m.) near Lycksele, 300–350 m. above sea level. Measurements of the depth of the bleached-earth layer showed smaller average depth under lichen-covered areas than under moss-covered areas. Statistical analysis showed that the relationship was slight but significant. A close statistical relationship was found between the fine-particle content of the soil and the degree of podzolization, both increasing together. Previous studies by the author and others on large areas had

failed to show any such relationship between moss or lichen cover and soil particle size. The difference between the results on large and small areas is attributed to the effect of other factors (e.g. fires, clear felling) operating uniformly on the small area but only locally on the large one.

1134. KLINCOV, A. P. O temperature počvy v elovo-listvennyh nasaždenijah različnogo vozrasta. **[Soil temperature in Spruce/hardwood stands of different ages.]** *Počvoved.* 1955 (6), (83–6). [Russ.] A.P.B.

Daily measurements were made at 8 a.m., from May to Oct. 1951, of soil temperatures at the surface and at depths of 5, 10, 20 and 30 cm., in 4 plots on medium to heavily podzolized clay-loam in the Lisinsk forest, Leningrad province: (1) A 1947 clear felling, with Birch and Aspen averaging 1 m. in height; (2) a thicket stand of 70% Norway Spruce with Birch, Aspen and scattered Scots Pine; height 1·8 m.; density 0·8; (3) polewood, 70% Spruce with the same associates; height 12 m.; density 0·9; and (4) an almost mature stand with Pine (density 0·1) in the first storey, and in the second, 70% Spruce (80–90 years old) with Aspen and Birch; height 17 m.; density 0·9. Monthly temperature amplitudes are tabulated and mean monthly temperatures at soil surface and at 10 and 30 cm. are graphed. In general, at least in spring to summer, soil temperatures decreased from (1) to (4), and even at 30 cm. depth (1) was always 3–4° C. warmer than (3) or (4) during the growing season.

114.2. Soil Chemistry

See also Nos. 1139–51, 1153–5, 1560–1.

1135. MARKOVSKIĬ, A. G., and PONOMAREVA, V. A. Gruppovoĭ sostav častic počvy menee 0·01 mm. i ego značenie v pogloščenii počvami fosfornoĭ kisloty. **[The group composition of soil particles < 0·01 mm. and its significance in the absorption of P_2O_5 by soils.]** *Počvoved.* 1955 (8), (49–60). 10 refs. [Russ.russ.] A.P.B.

Laboratory experiments on a wide range of soil types from different parts of the U.S.S.R., using three variations of Tjulin's 'fractional peptization' method [see *For. Abstr.* 17 (Nos. 19–20)] to separate the structural components into Tjulin's groups I and II and particles > 0·01 mm., showed that the last category absorbed practically no P_2O_5. Group II in all cases absorbed more P_2O_5 than did group I particles; both groups, however, showed variations in samples from different soil types, and sometimes within the same soil type. In the soils studied, the group composition as regards I and II appeared to account for all differences between the soils in P_2O_5 absorption.

1136. MEIKLEJOHN, J. **Nitrogen problems in tropical soils.** *Soils & Fertil.* 18 (6), 1955 (459–63). 24 refs.

A review of the subject, including nitrification, manuring and N-fixation by root nodules.

1137. SWAINE, D. J. **The trace-element content of soils.** *Tech. Commun. Bur. Soil. Sci., Harpenden* No. 48, 1955. pp. 157. 26 pp. of refs. Price 25*s.*

Attempts to collect and correlate references dealing with the occurrence of trace elements in soils. In addition to the analytical data, the nature of the papers and their possible usefulness are indicated.

1138. CURTIS, J. T., and DIX, R. **The vertical distribution of alpha-emitting radioactive substances in certain forest types.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (88). A.P.B.

Analysis of the ash of leaves and leaf litter and the A and C layers of the soil with a scintillometer, for determining the distribution of α-emitting radioactive substances, showed a uniform pattern of distribution in various forest communities in Wisconsin and the southern Appalachian mountains. The subsoils had very low, the ash of living leaves appreciably higher, and the dead and decomposing leaves in the A_0 layer of the soil very much higher concentrations of such substances. A number of non-radioactive rare elements also reach relatively high concentrations in the surface layer of the soil.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 1129, 1133, 1159, 1165–7, 1387, 1390, 1551.

1139. PONOMAREVA, V. V. K voprosu o roli rastiteljnosti v podzoloobrazovanii. **[The role of vegetation in podzol formation.]** *Počvoved.* 1955 (8), (1–12). 22 refs. [Russ.] [Počvennyĭ Institut im. V. V. Dokučaeva, Akad. Nauk SSSR.] A.P.B.

Endorses Rode's criticism of Remezov's views [see *For. Abstr.* 16 (No. 2601)], but contests Rode's hypothesis that living roots may be a main agent in the process of podzol formation. The differences in podzolization that occur in passing from (1) northern parts of the coniferous forest zone to (2) southern parts of that zone and the forest-steppe can be interpreted in terms of humus composition in conjunction with changes of climate and vegetation. The author's view is as follows:—In (1), pronounced podzolization is connected with the low ash content of the vegetation and dominance of fulvic acids during humus formation: neutralization of the acids formed takes place chiefly with weak bases (Fe, Al) in the soil-forming minerals. In (2) the vegetation has a higher ash content, and though there is some excess of fulvic acids, humic acids are also produced: these acids tend to distribute themselves through the profile differentially, according to molecular structure and other properties—the humic acids combining with Ca to form a more neutral humus-accumulation horizon, while the excess fulvic acids percolate downwards to form a more acid podzol horizon. The chief factors in the zonation from chernozems to marked podzols are probably: (*a*) increasing moisture, with increasing dilution of soil solutions, preventing the formation of stable compounds and favouring leaching; (*b*) increase in the ratio of organic C in plant remains to the quantities of bases and N involved in the nutrient cycle; and (*c*) as a result, increase in the degree of dispersion, acidity and activity of humus in relation to soil minerals.

1140. SMIRNOVA, K. M., and GROMAŠEVA, B. N. Dinamika himičeskih svoĭstv počv pod hvoĭnymi zelenomohovymi lesami. **[The dynamics of chemical properties of soils under coniferous forests of the '*hylocomiosa*' types.]** *Počvoved.* 1955 (6), (45–52). 10 refs. [Russ.] [Moskovskiĭ Gosudarstvennyĭ Universitet.] A.P.B.

The studies described were made at Zvenigorod, Moscow province, on podzols under stands of site class I, both with an A_0 horizon 3 cm. thick: (1) light clay-loam under Norway Spruce (60-year-old, density 1·0), with continuous moss cover (*Pleurozium schreberi* and *Hylocomium proliferum*); and (2) sandy loam under Scots Pine (50-year-old, density 0·8), with the same mosses plus scattered patches of *Dicranum*. Data are given in tables, for each of the months May to Oct. (1953 and 1954 for (1), 1954 only for (2)), from chemical analyses at various depths down to 35 cm. (pH of water suspension; humus % and acidity in m.e. of aqueous extracts; exchangeable Ca, exchangeable and hydrolytic acidity in m.e.; humus and N %; P_2O_5 and K_2O in mg./100 g.) and some of these properties are separately graphed for the A_0 horizon. Podzolization under the influence of acid decomposition products from litter and A_0 horizons is intense, the podzol horizon developing directly under the latter. Despite the higher acidity and lower Ca content found for A_0 under Pine, the process is more intense under Spruce, where it is possible that stronger acids may be formed which, though partially neutralized by the higher Ca content, may yet be more capable of breaking down mineral soil compounds. The effect of weather is seen in a decrease of acid formation and percolation in dry spells. The bulk of the contents of the main nutrients occurs in the A_0 horizon: quantities varied during the growing season over the following ranges for (1) and (2) respectively: total N 320–470, 260–380; exchangeable Ca 240–270, 140–175; mobile P_2O_5 14–21, 13–19; mobile K_2O 6–8·5, 7–13 kg./ha.

1141. BLOOMFIELD, C. **A study of podzolization. VI. The immobilization of iron and aluminium.** *J. Soil Sci.* 6 (2), 1955 (284–92). 6 refs.

[Cf. *For. Abstr.* 17 (No. 32).] In general, the extent of sorption of Fe and Al leaf-leachates on soil colloids varies inversely as the efficiency of the species as a podzolizing agent. This statement is supported by a detailed account of laboratory investigations. One table shows the % of Fe sorbed at pH 5·5, 6·7 and 7·6 when ferrous leaf extracts of Ash, Aspen, Oak, Larch, Scots Pine, Rimu and Kauri percolate down columns of wet ferruginous sand.

1142. BLOOMFIELD, C. **Leaf leachates as a factor in pedogenesis.** *J. Sci. Food Agric.* 6 (11), 1955 (641–51). 27 refs. [Rothamsted Experimental Station, Harpenden, Herts.] O.R.S.

Summarizes the results of a series of experiments, already reported, on the influence of water extracts of leaves of Scots Pine, Larch, Aspen, Ash, *Dacrydium cupressinum* and *Agathis australis* on migration of sesquioxides and clay in relation to soil podzolization. [Cf. *For. Abstr.* 15 (No. 2215).]

1143. DIMBLEBY, G. W., and GILL, J. M. **The occurrence of podzols under deciduous woodland in the New Forest.** *Forestry* 28 (2), 1955 (95–106). 14 refs.

Examination of the soils of six small unenclosed Oakwoods, all on the plateau gravels of the New Forest, showed that two of them were essentially brown forest soils, but the other four had pronounced features of podzolization. Pollen analysis revealed that the four podzolized ones had once borne heathland, whereas the other two had no such history. Particular attention was paid to the state of the humus layer in each wood. Those with brown forest soils maintained mull humus, probably by virtue of their mixed floristic composition. For those woods which had developed from heath it was demonstrated that Holly was a pioneer species which, through its litter, could convert raw humus to mull humus, so that these woods showed mull conditions at the surface of what otherwise appeared to be a heath podzol. In both types of wood, Beech had become established avificially, and under old trees raw humus formation with attendant podzolization was demonstrated. It is suggested that the natural climax on these poor gravels is still an Oak-dominated forest in equilibrium with a brown forest soil. Podzolization is a secondary condition. *Authors' summary.*

1144. ORLOV, A. JA. O roli sosuščih korneĭ drevesnyh rasteniĭ v obogaščenii počvy organičeskim veščestvom. **[The role of the absorbing roots of woody plants in enriching the soil with organic matter.]** *Počvoved.* 1955 (6), (14–20). 10 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR.] A.P.B.

Gives the results of a preliminary study in autumn 1953 in two pure Norway Spruce plantations, site class I, on leached clay-loam chernozems in Orlov province: (*a*) 25-year-old, density 1·1; (*b*) 50-year-old, density 0·8. Data are tabulated for live roots < 0·5 mm. in diam. (with separate figures for those < 0·3 mm. and for root-tips with live phloem parenchyma), dead roots (< 0·5 mm., > 0·5 mm.), various other organic remains, mycelial strands, and total humus, all expressed in metric tons dry wt./ha. Figures for dead roots, in (*a*) and (*b*) respectively, were: < 0·5 mm.—7·5, 1·6; > 0·5 mm.—1·5, 4·3 tons/ha. From the data obtained the author hazards an estimate that the dead roots annually accruing to the soil should be ca. 2·0 tons/ha. for (*a*) and 0·5 for (*b*), representing about 20 and 50% respectively of the matter accruing from the annual needle-fall. The role of roots in the turnover of nutrient materials must therefore be considerable, and further research is highly desirable.

1145. MINA, V. N. Krugovorot azota i zoljnyh èlementov v dubravah lesostepi. **[Cycle of N and ash elements in mixed Oak woods of the forest-steppe.]** *Počvoved.* 1955 (6), (32–44). 9 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR.] A.P.B.

Discusses and presents in tables the results of studies made in 1952–53 in 4 plots of mixed Oak wood (Oak/Ash, with Lime, Elm, Norway and Field Maples; of the *Aegopodium podagraria/Carex pilosa* type; main storey aged 25, 43, 56 and 220 years) on dark-grey forest soils of high base status in the

Tellerman Forest, Voronezh. Data on composition and constitution of the plots are given. In each plot sample trees were taken for determination of weight of stems, branches and foliage, which were separately analysed for N and the chief ash elements (Ca, Mg, K, P, S, Si). Full enumeration data, including c.a.i. for all trees, were available. Five soil monoliths were taken per plot for determination of root-weights, and the taproot and first-order laterals of each sample tree were excavated. Weight and composition were also determined for the ground vegetation and litter. Yield-table values were taken to estimate the part played by mortality. The calculations based on these data are summarized in a table indicating for each element [S and Si are here omitted] and each age of stand the amounts annually taken up, not returned (held in living trees or in dead trees, which are removed), and returned to the soil (in litter, herbaceous cover, and roots of dead trees). No account could be taken of other possible means of return to the soil (e.g. through living roots). The figures obtained show no great variation with age. Totals for uptake, retention and return, in that order, were roughly: N 85–92, 30–33, 54–60; P_2O_5 14–15, 7–9, 6–8; K_2O 88–103, 20–28, 63–77; CaO 123–142, 12–22, 104–125; MgO 24–27, 2–5, 20–24 kg./ha. In general, both uptake and return to the soil have maxima at 40–55 years. Amounts of Ca and Mg retained show a considerable decline in the oldest stand. The ash and N returned to the soil averaged 90% of the annual dead matter. Under the conditions of this study there seems to be no critical period for nutrient supply in the course of a generation, and the small net consumption of nutrients is presumably made good by extraction of nutrients by tree roots from the deeper soil layers.

Methods used in studies by Remezov and Bykova [cf. *For. Abstr.* 16 (No. 2755)] are criticized.

1146. Evdokimova, T. I. O vlijanii duba na himičeskie svoïstva seryh lesnyh počv. **[The influence of Oak on the chemical properties of grey forest soils.]** *Počvoved.* 1955 (6), (53–9). 11 refs. [Russ.] A.P.B.

Gives the results of chemical analyses of soil and of material from all aerial and underground parts of *Quercus robur* sample trees (1 per plot) from three plots—20, 45 and 100 years old—of the *Aegopodium podagraria/Carex pilosa* type in the former 'Tul'skie Zaseki' reserve. Associated tree species (chiefly Lime and Maple) are not considered. At all ages the ash content was highest in the foliage, then in fine branches and roots, with least in the stem. Leaves were richer than other parts in Si, K, N, and usually also in Ca. The aerial parts in general were richer in N and Ca than the roots, which were richer in Si, Fe, S, P, and especially Al. The content of the last in the roots was always higher than that in other parts; only very small amounts of Al are returned to the soil by leaf-fall, so that dead roots must constitute the chief means of return. It is probably significant that high contents of exchangeable Al and exchangeable acid were formed in the lower soil horizons. Roots in the A_1 horizons were richer in N than those at deeper levels. For the two older stands, roots in B_2 and to some extent in B_1, showed greater accumulation of K, P and S than those at higher levels. In youth, with roughly equal weights of roots and aerial parts, the roots contained the greater amount of nutrient elements. With increasing age, and increasing ratio of stem and crown to roots, the greater part of the nutrients were accumulated in the former. The main ash constituents of leaf litter were Ca, Si and N, with smaller quantities of K, P, S and Mg. Supporting data are presented in 7 tables.

1147. Solovjev, P. E. Vlijanie lesonasaždeniï na temnokaštanovye počvy v Saljskoï lesnoï dače. **[The influence of tree plantations on dark-chestnut soils in the Sal'sk district.]** *Počvoved.* 1955 (6), (66–73). 8 refs. [Russ.] A.P.B.

Tabulates and discusses data on the physical and chemical properties, at various depths, of heavy clay-loam dark-chestnut soils on the Sal'sk steppes, Rostov province: (*a*) under plantations (ca. 750 ha. of Oak/Elm/Ash were planted between 1888 and 1911), and (*b*) on the open steppe. [Table heads do not specify age and composition of the plantations concerned.] Compared with (*b*), (*a*) show improvement in structural aggregation and especially in the % of water-stable aggregates in the upper horizons; have a somewhat higher humus content, with a higher content of humic acids and lower of fulvic acids, hemicellulose and cellulose; and are richer in Ca, Mg, N, P, and K. Aqueous extracts of (*a*) show insignificant contents of Cl and SO_4 ions even at depths of 190–200 cm., whereas in (*b*) the contents of both ions, and especially SO_4, are considerably greater at the 180- to 190-cm. level.

1148. Birjukova, A. P. Izmenenie počvy pod lesnymi nasaždeniami v uslovijah Prikaspiïskoï nizmennosti. **[Soil changes under shelterbelts in the conditions of the Caspian lowland.]** *Počvoved.* 1955 (6), (60–5). 5 refs. [Russ.] A.P.B.

Tabulates and discusses data on morphological, physical and chemical soil properties and on ground vegetation in, and at distances up to 300 m. from, a 23-year shelterbelt established to trap snow on flat land with solonized light-chestnut soils of loamy and sandy-loam texture, near Lake Elton. The belt, 1–3·5 m. high, consisted entirely of shrubs (*Elaeagnus angustifolia* and *Caragana arborescens*, with *Amorpha fruticosa*, *Tamarix* sp., *Halimodendron* sp. and *Calligonum* sp.). The soil in or adjacent to the belt showed an increase in the thickness of horizons, a higher humus content, lowering of the level at which effervescence with HCl occurs, a deeper-lying horizon of carbonate accumulation, and no efflorescence of sulphates. The vegetation in and near the belt differed considerably from the natural xerophytic/halophytic steppe vegetation. In the belt especially, and, to some extent, to distance of 10 m., there was a marked improvement in total porosity and infiltration capacity. No salt was found to a depth of 3–4 m. under the belt and sulphates were absent except at about 155 cm., the horizon of gypsum accumulation. The influence of the belt in promoting the leaching out of Cl, SO_4, and alkali-metal ions was still discernable at a distance 20 times its height, but was most pronounced in the first 30 m.

1149. MIKOLA, P. Kokeellisia tutkimuksia metsäkarikkeiden hajaantumisnopeudesta. [**Experiments on the rate of decomposition of forest litter.**] *Commun. Inst. for. Fenn.* 43 (1), 1954 (1955). pp. 50. 52 refs. [Fi.e.]

Presents the results of field and laboratory experiments by the Finnish Forest Research Institute to compare the rapidity of decomposition of the litter of different plant species and to study the effect of certain environmental conditions on the rate of decomposition. Of the species tested, the litter of *Sorbus aucuparia, Acer platanoides, Alnus glutinosa* and *Maianthemum bifolium* decomposed most rapidly; the litter of *Larix decidua, Pteridium aquilinum* and *Hylocomium* mosses more slowly. In general pH rose in proportion to rate of decomposition. The relative decrease of the main constituents of litter types is presented in graphs. At the beginning, water-soluble substances and hemicelluloses decompose most rapidly, but later slow down. The reduction of cellulose proceeds at a constant rate. Lignin and proteins are the most resistant. N is reduced slowly and accordingly the % of N increases with advancing decomposition. No general correlation was found between rate of decomposition and nutrient content of litter. Decomposition proceeds more rapidly in the south of Finland than in the north, presumably because of climatic differences. The typical vegetation of Finnish forests—conifers with ground vegetation of *Hylocomium* and dwarf shrubs—produces litter that decomposes slowly, so that there is a strong tendency to form raw humus. The litter of the only common and valuable broadleaved tree, White Birch, is inferior to that of most other deciduous trees. Common trees that produce a better kind of litter, such as *Alnus incana* and *Sorbus aucuparia*, have no economic value. Larch litter is not superior to that of other conifers. The growing of Birch in mixture with conifers is, however, recommended, since its leaves do decompose more rapidly than needles and it also discourages harmful mosses. [Cf. *For. Abstr.* 17 (No. 1165).]

1150. MIKOLA, P. Alustavia tutkimuksia metsähumuksen katalaasi-vaikutuksesta. [**Preliminary studies on the catalytic power of forest humus.**] *Commun. Inst. for. Fenn.* 42 (6), 1954 (1955). pp. 21. 7 refs. [Fi.e.]

Presents the results of determinations of the catalytic power (= ability to split H_2O_2 into water and free O) of humus in different Finnish forest soils. In podzol profiles the catalytic power (*c*) was highest in litter and the upper layer of humus, and absent from the unchanged subsoil; it was higher in the B than in the A_2 horizon. In peat soils it occurred in the uppermost layer only. In general, *c* was higher in deciduous than in coniferous forests, and higher in Spruce than in Pine stands. It was very low in Sphagnum moss. Burning of slash and ground vegetation almost entirely destroys *c* in the humus, as does heating of humus samples in an autoclave, but it is unaffected by the acidity and by the organic-matter content of humus. It is concluded that *c* of forest humus is predominantly of enzymatic origin and that it reflects both the activity of aerobic micro-organisms and the oxidation-reduction potential of the soil. Its use in forest-soil studies is discussed.

114.4. Soil Classification. Soil Types

See also Nos. 1133, 1139–48, 1389, 1406, 1542–3, 1596.

1151. MORALES CHOFRÉ, E. Análisis mecánico, físicoquímico y químico de 132 muestras de suelos forestales, procedentes de quince provincias españolas. [**Mechanical, physico-chemical and chemical analysis of 132 forest soil samples from 15 Spanish provinces.**] *Comun. Inst. for. Invest. Exp. Madrid* 26 (5), 1955. pp. 40. [Span.]

1152. SOLJANIK, I. Osobine i klasifikacija zemljišta obešumljenih terena. [**Characteristics and classification of land in deforested areas.**] *Šumarstvo* 8 (7/8), 1955 (461–73). 22 refs. [Serb.e.f.]

For purposes of reforestation the author differentiates 10 main types of denuded forest land on the slopes of watersheds in the mountainous regions of Jugoslavia (particularly in Serbia and Macedonia), based on configuration, degrees of denudation, and soil.

1153. MOSS, H. C., and ST. ARNAUD, R. J. **Grey wooded (podzolic) soils of Saskatchewan, Canada.** *J. Soil Sci.* 6 (2), 1955 (291–311 + 4 photos). 34 refs.

The literature of these soils, which cover many million acres in W. Canada, is reviewed, the principal podzolic varieties of Saskatchewan tabulated, and a map of the 6 soil zones of the province included. The soils carry mixed-wood and northern coniferous types. Eight profiles with tables of analyses and one of median values and range in chemical constituents and pH are given. These studies confirm earlier conclusions that these soils form a distinct branch of the podzolic family. Their nomenclature and position as a world group are discussed.

1154. RODE, A. A., and FEOFAROVA, I. I. Neskoljko dannyh o mineralogičeskom sostave 'kremnezemistoĭ prisypki' v lesostepnyh počvah. [**Some data on the mineralogical composition of the 'siliceous deposits' [on soil aggregates] in forest-steppe soils.**] *Počvoved.* 1955 (9), (58–60). 4 refs. [Russ.] [Počvennyĭ Institut im V. V. Dokučaeva Akademii Nauk SSSR.] A.P.B.

The presence of 'siliceous deposits' on the surface of aggregates in these soils has long been known, but their composition has never been studied in detail. The authors' mineralogical analysis of samples from a feebly podzolized chernozem, a dark-grey, and a grey forest soil under deciduous species in the Cherny Les (a block of natural forest in the Ukraine), showed no great difference between the 'deposits' and the soil as a whole, though the former had a somewhat higher content of quartz and feldspars and were relatively poorer in clayey matter (and, to judge by their light colour, in humus also). The hypothesis is advanced that the 'deposits' represent the soil itself, modified by the action of roots, mycorrhizae and micro-organisms. Analytical data are tabulated.

1155. Spurr, A. M. M. **The soils of Mbozi (Mbeya District): a study in relation to the geology and physiography.** *Bulletin, Geological Survey Department, Tanganyika* No. 24, 1955. pp. 35 + 3 maps. 14 refs. Price 7·50*s*.

Covers geology, climate, water supply and vegetation, with geological and physiography/vegetation maps (1 : 125,000) and a soils map (1 : 100,000). The soils contain two major catenas and many types which are classified by age and parent material, with their physical and chemical characters displayed diagrammatically by horizons. There are detailed profile descriptions and notes on productivity and erosion. *Brachystegia* forest is the main vegetation type.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 1132–3, 1136, 1159, 1203, 1332, 1558–63, 1823, 1849–51.

1156. Žurbickiĭ, Z. I., and Šmatok, I. D. Potrebnostj derevjev i kustarnikov v mineraljnom pitanii v poljarnyh uslovijah. **[The mineral nutrient requirement of trees and shrubs under polar conditions.]** *Fiziol. Rast.* 2 (5), 1955 (465–75). 10 refs. [Russ.] [Poljarno-aljpiĭskiĭ Botaničeskiĭ Sad Koljskogo Filiala im. S. M. Kirova Akademii Nauk SSSR, Kirovsk Murmanskiĭ.] A.P.B.

Fertilizer trials were made at Kirovsk, Kola Peninsula, on young plants of woody species grown in the open, including (*a*) *Betula tortuosa, B. megrelica, Sorbus glabrata* and *S. sibirica* (all in their 1st and 2nd years; [fertilizer unspecified]) and (*b*) *Prunus padus, Caragana arborescens, Syringa vulgaris* and *Pyrus baccata* (all in their 2nd, 3rd and 4th years; N P K fertilizer). The bulk of the paper is devoted to (*b*), in which growth measurements were supplemented by plant analyses for N, P and K during the 3rd year of life. Results showed that in the poor, cold soil of this region there was little response to fertilizer in the first two years of life, and at this age dosages should be small so as not to increase unduly the concentration of the soil solution, to which such plants are sensitive. Increased response occurs in the third and subsequent years, and dosages should be increased, though care must be taken to supply nutrients in the correct ratios, which differ from species to species. A table of suggested dosages, for the conditions concerned, to be applied in two treatments during the 3rd year, is given for the species under (*b*).

114.6. Soil Biology

See also Nos. 1132, 1136, 1150, 1560.

1157. Rosa, K. Půdní mikroflora a mikrofauna ve smrkovém porostu na Pradědu. **[The soil microflora and microfauna in a Spruce stand on Mt. Praděd.]** *Sborn. čsl. Akad. zeměd.* (*rost. Výroba*) 28 (3/4), 1955 (279–82). [Cz.cz.] C.G.B.

Investigations of the litter, coarse humus, and fine humus under an almost virgin Spruce stand (alt. 1050–1200 m., with *Vaccinium myrtillus, Adenostyles alliariae, Athyrium alpestre, Calamagrostis arundinacea* and *C. villosa*; pH 3·5–4) showed that the number of ciliates was very small, whereas the protozoa were represented in much greater numbers, particularly in coarse humus.

1158. Warteresiewicz, M. Charakterystyka mikrobiologiczna niektórych gleb leśnych województwa krakowskiego. **[The microbiological characteristics of some forest soils of Kraków province.]** *Ekologia Polska, Warszawa* 2 (1), 1954 (23–30). 11 refs. [Pol.russ.e.] BL.U.

By the use of soil extracts on agar, and on selective media, micro-organism content and composition were ascertained for surface-soil samples from 26 sites whose pH, moisture and organic-matter content, and stand composition (mostly Oak, Beech, Hornbeam, Alder and other hardwoods, but also conifers and mixtures) are tabulated. Micro-organisms varied from 35 million/1 g. dry soil in a hardwood stand with Hornbeam (pH 6·6)—the only place where *Azotobacter* was found—to about 800,000 under another hardwood mixture (pH 4·1). Soil under conifers contained fewer Actinomycetes than that under hardwoods, and very few nitrifying bacteria. The latter were found in ca. 45% of the samples and were nowhere numerous. Altogether microbiological activity was less than that found in similar investigations at the Białowieża National Park.

1159. Saksena, S. B. **Ecological factors governing the distribution of soil microfungi in some forest soils of Sagar.** *J. Indian bot. Soc.* 34 (3), 1955 (262–98). 42 refs. O.B.D.

Presents the results of a study of microfungi occurring in various types of forest soil near Sagar. In all, 63 soil samples were studied, representing 7 types of soil (one of them a grassland type). Surface vegetation was also analysed. The number of fungi decreased down the soil profile. Moisture is an important factor, very few fungus species being able to survive the summer in soils exposed to the sun. Quantity of organic matter, N content and exchangeable Ca are favourable to the multiplication and growth of the fungi; pH does not noticeably affect their abundance. The combined effects of the dominant edaphic factors were more important than any single factor. Data on the distribution of various groups of fungi are presented. There are pioneer fungus species such as *Penicillium funiculosum* and *Aspergillus fumigatus* that are confined to poor soils and can stand heat. These may serve as useful indicators of poor soils. There are also a number of species that appear only in climax conditions and not in the earlier successional stages. These are *Gliocadium deliquescens, G. roseum, Aspergillus variecolor, Cunninghamella bertholletiae*, and *C. verticillata*. These would also be good indicators of well developed soils. Finally there are ubiquitous species that seem to have a high ecological tolerance; these are *Aspergillus niger, Absidia spinosa* and *Penicillium nigricans*. Though these could survive any conditions, their highest frequency was reached in good and mature soils. There are also many fungi that do not fall into any of these characteristic distributional patterns. The number of species and the total number of fungi increase progressively from

the pioneer to the climax types of soils and a striking parallel was revealed with the higher vegetation in the successional sequence of the microfungi from the pioneer to the climax types. *From author's summary.*

1160. SAPPA, F. Nuove specie di *Aspergillus* dei terreni forestali somali. **[New species of *Aspergillus* from the forest soils of [Italian] Somaliland.]** *Allionia, Torino* 2 (1), 1954 (79–95 + 4 photos). 13 refs. [It.it.e.] H.S.B.

Describes 3 new species: *A. aeneus, A. eburneocremeus* and *A. multicolor*. All were isolated from the soils of gallery forests of the Juba. They are believed to belong to the *A. nidulans* group.

1161. SAPPA, F., and MOSCA, A. M. Ricerche sulla micoflora dei terreni forestali somali. **[Research on the mycoflora of the forest soils of [Italian] Somaliland.]** *Allionia, Torino* 2 (1), 1954 (145–93). 50 refs. [It.it.e.] H.S.B.

Includes an annotated list of 69 species isolated from soils in gallery forests of the Juba, including 3 new species—*Torula atra, Rhizoctonia rubiginosa*, and *R. lilacina*. The three forests studied are very similar ecologically, but the soil floras are very heterogeneous. A feature of all, however, is the predominance of the genera *Penicillium* and *Aspergillus*.

1162. SAPPA, F., and MOSCA, A. M. Ricerche sulla micoflora dei terreni della savanna spinosa somala. **[Research on the mycoflora of the soils of the thorn-savanna of [Italian] Somaliland.]** *Allionia, Torino* 2 (1), 1955 (195–238 + 1 plate). 57 refs. [It.it.e.] H.S.B.

A study was made of the fungus populations of 90 soil samples taken at various depths (mostly 5–20 cm., more rarely 20–40 cm.) in various sites in the thorn bush. The authors briefly discuss the reasons for considering this formation as a type of savanna. An annotated list is given of 68 isolated taxa, 4 of which (*Hormiscium nodulosum, Diplococcium avellaneum, Rhizoctonia coniothecioides* and *R. fuliginea*), are described as new species. The same taxonomic groups as have already been found in the soil of some gallery forests along the Juba River [see preceding abstract] were found also in the fungus population of the thorn savanna, the difference between the two populations consisting essentially in the number of species within the individual genera or major taxonomic groups. It is suggested that accurate, comparative studies of the fungus populations of soils under thorn savanna, gallery forest, and tropical rain forest would supply useful data complementary to the study of the affinities of these great tropical communities. *From authors' summary.*

1163. GARREN, K. H., MAY, J. T., and WALSH, C. S. **Micro-organisms in nursery seedbed soils.** *Tree Plant. Notes* No. 21, 1955 (21–3).

Lists the fungi found in an Alabama nursery soil (1) by genera, (2) by type ((*a*) cellulose destroyers, (*b*) antagonists, (*c*) pathogens). Many of the active fungi were beneficial. Incidence of (*a*) and (*b*) increased sharply with rising temperatures while (*c*) decreased. The (*a*) community remained in equilibrium, but (*c*) tended to be replaced by (*a*) and (*b*).

1164. HUIKARI, O. Tutkimuksia ojituksen ja tuhkalannoituksen vaikutuksesta eräiden soiden pieneliöstöön. **[Studies on the effect of drainage and ash fertilization upon the soil microflora of some swamps.]** *Commun. Inst. for. Fenn.* 42 (2), 1953 (1955). pp. 18. 14 refs. [Fi.e.]

Analysis of the soils of swamps that had been drained and burnt showed that the improvement in nutrient status due to burning extended only to a depth of 10 cm. The improvement observed in the structure of peat soils and the healthiness of trees after burning is tentatively ascribed to the effect of burning and draining on the fungi, bacteria, and yeasts in the soil. Data from a number of analyses are given in tables with English and Finnish legends. Down to a depth of 30 cm., drainage and burning produced important changes in the soil microflora, but no effects were observed below that level. It is clear that the properties of the surface 30 cm. of peat are decisive for tree growth, and silvicultural requirements will be best met by a dense system of shallow ditches.

1165. MIKOLA, P. Metsämaan kantasienien kyvystä hajoittaa neulas- ja lehtikarikkeita. **[Experiments on the ability of forest soil basidiomycetes to decompose litter material.]** *Commun. Inst. for. Fenn.* 42 (7), 1954 (1955). pp. 17. 20 refs. [Fi.e.]

Presents the results of pure-culture experiments, where 41 species of basidiomycetes were tested—mainly such species as grow well on agar and are supposed to decompose litter; some known mycorrhizal fungi were included. The results are given in tables with English legends. Active lignin decomposers were *Clavaria tigula, Clitocybe cerussata, C. clavipes, C. odora, Collybia butyracea, C. dryophila, Hypholoma fasciculare, Marasmius perforans, Mycena galopus, M. lactea, M. rosella, M. sanguinolenta, Pholiota mutabilis, Polyporus* [*Fomes*] *annosus, P. betulinus*, and *Stropharia depilata*. Litter was decomposed without decolorization by *Armillaria mellea, Laccaria* (*Clitocybe*) *laccata, Mycena epipterygia*, and *M. metata*. Mycorrhizal fungi grew poorly on litter and many of them failed entirely. Leaf litter was decomposed much faster than coniferous needles. [Cf. *For. Abstr.* 17 (No. 1149).]

1166. HENDERSON, M. E. K., and FARMER, V. C. **Utilization by soil fungi of *p*-hydroxybenzaldehyde, ferulic acid, syringaldehyde and vanillin.** *Repr.* from *Journal of General Microbiology, London* 12 (1), 1955 (37–46). 12 refs. [Macaulay Institute for Soil Research.]

A number of fungi isolated from soils under a variety of vegetation types were found to attack *p*-hydroxybenzaldehyde, ferulic acid, syringaldehyde, and vanillin. These compounds were used as the sole source of C by the organisms tested. By means of spectrochemical methods and paper chromatography it was shown that vanillin and ferulic acid were converted to vanillic acid before the breaking of the benzene ring, and syringaldehyde was converted to syringic acid. The bearing of these results on the breakdown of lignin in the soil is discussed.

1167. KEVAN, D. K. McE. [Editor]. **Soil zoology: Proceedings of the University of Nottingham Second Easter School in Agricultural Science, 1955.** Butterworths Scientific Publications, London. 1955. pp. xiv. + 512. Many refs. Price £2. 15*s*.

Part I (General) contains the following papers: An introduction to the study of soil animals (*W. Kühnelt*); Identification of soil- and litter-inhabiting animals (*D. K. McE. Kevan*); A brief introduction to the major groups of soil animals and their biology (*W. Kühnelt*); Soil-inhabiting nematodes (*B. G. Peters*); Identification of terrestrial mites (*G. O. Evans*); Termites and the soil (*W. V. Harris*); Animal activity in soils as a decisive factor in establishment of humus forms (*W. L. Kubiena*); Earthworms and soil structure (*W. J. McL. Guild*); Ecology of the fauna of forest soils (*P. W. Murphy*); Influence of soil types on the epigeic fauna of agricultural land (*W. Tischler*); Millipedes and centipedes as soil animals (*J. G. Blower*); Soil sampling for symphylids and a note on populations (*C. A. T. Edwards*); Long-term changes in collembolan populations with special reference to moorland soils (*D. H. Murphy*); Vertical distribution of mites and collembola in relation to soil structure (*N. Haarløv*); Some aspects of earthworm ecology (*J. E. Satchell*); Survey of a year's results obtained by a recent method for the extraction of soil-inhabiting enchytraeid worms (*C. O. Nielsen*); Effect of agricultural practice on the soil fauna (*W. Tischler*); Applied soil biology and plant protection (*A. Brauns*); The effects of DDT and BHC on soil collembola and acarina (*J. G. Sheals*); A note on longevity of soil larvaecides (*E. R. Tinkham*); Some current British soil pest problems (*E. B. Brown*); A preliminary key to British species of Heterodera for use in soil examination (*B. A. Cooper*); A note on cutworms and their rearing (*M. P. Singh*); Inter-relations between soil microflora and soil nematodes (*C. L. Duddington*); Soil fungi that prey on protozoa (*M. Peach*).

Part II contains a number of papers on methods of sampling, extracting, preparing, and preserving samples of soil fauna, apparatus for studying metabolism in soil animals, and the production and use of controlled atmospheres and water regimes in experimental work. There is a key to the orders and sub-orders of soil- and litter-inhabiting animals; also author, animal-genera and general indexes. Bibliographical references are appended to each paper.

116. Hydrology. Water Conservation, Soil Conservation and Erosion

See also Nos. 1129–30, 1152, 1155, 1204–8, 1387, 1544–7, 1562, 1589–90, 1689–90, 2336–9.

1168. TANAKA, K. **[On the rate [ratio] of the amount of rain falling to the [through-fall below] Japanese Black Pine young trees.]** *Journal of Agricultural Meteorology, Tokyo* 9 (3/4), 1954 (112–4). 5 refs. [Jap.e.] L.S.

Of a shower amounting to 1 mm., 40–50% penetrated the crown of a 3-year-old and 60–70% that of a 2-year-old seedling. With larger amounts of rain, penetration increased, reaching a maximum of 90–95% at 5 mm. for the larger, and 3 mm. for the smaller seedling. An arrangement of pipes on the reception plate permitted the elimination of stem flow.

1169. KATAOKA, J. **[Index of infiltration on the slope.]** *Bull. Tokyo Univ. For.* No. 47, 1954 (111–24). 4 refs. [Jap.jap.e.]

Surface run-off occurs where rainfall intensity exceeds infiltration capacity, the latter exceeding 100 mm./hour in the average Japanese forest although some run-off may occur at intensities < 100 mm./hour. Using an infiltrometer of Japanese design (illustrated) the author establishes that for these lower intensities, the infiltration rate on slopes varies with the intensity of the rain (i), presumably owing to variations along the ground of infiltration capacity. This varying infiltration rate, designated as the infiltration index, ϕ, was found to vary linearly as $\phi = ki + a$ where k and a are constants. Values for ϕ in forested, grassed, and denuded (and trampled) land were respectively 0·9, 0·4–0·5, and nearly zero. The data are tabulated and graphed, the graphs having English captions.

1170. NOGUCHI, Y. **[A study on the method of finding the effect of forest cutting or forest growth on the run-off.]** *Bull. Tokyo Univ. For.* No. 47, 1954 (91–110). 13 refs. [Jap.jap.e.]

Using data (legends and table headings in English) from experiments in America, Europe and Japan, a method is propounded for establishing the comparability of even widely separated catchments where the precipitation (P) exceeds 1500 mm. Above this point, run-off (R) and P are related in a straight-line regression. By using this for statistical control, the variation in R can be studied independently of changing P, and data from both control and treated plots continue to be useful. Moreover, through this regression the ratios, R/P, of two or more catchments can be compared if they are first adjusted to correspond with equal P. The test for initial comparability of two catchments A and B is that the ratio of the standard deviation (*S.D.*) of the run-off in A to *S.D.* of run-off in B should be less than the ratio of the *S.D.* of the run-off of B to precipitation of B. Formulae for the simplification of variance analysis are given and the comparability of two (non-adjacent) catchments in the university forest is established.

1171. BURGER, H. Einfluss des Waldes auf den Stand der Gewässer. VI. Mitteilung. Der Wasserhaushalt in der Valle di Melera in den Jahren 1944/45 bis 1953/54. **[The influence of forest on the water régime. Part VI. The water régime in the Valle di Melera from 1944–45 to 1953–54.]** *Repr.* from *Mitt. schweiz. Anst. forstl. Versuchsw.* 31 (2), 1955 (493–555). 47 refs. [G.g.f.it.]

[For earlier reports see *For. Abstr.* 8 (No. 71).] The present figures confirm previous findings. The erratic distribution of the rainfall and the fact that only one gauging station was involved, made it difficult to draw definite conclusions from the experiment.

1172. MOYLE, R. C., and ZAHNER, R. **Soil moisture as affected by stand conditions.** *Occ. Pap. Sth. For. Exp. Sta.* No. 137, 1954. pp. 14. 4 refs.

Soil moisture was measured in the dry summer of 1953 on imperfectly drained silt-loam sites (Leshe series) in S. Arkansas, stocked respectively with all-aged Pines plus hardwood understorey; all-aged hardwoods, either untouched or treated by poisoning all trees above 4 in. d.b.h., in 1951 or 1953; and even-aged young hardwoods. One plot in the Pine stand was completely bared of all vegetation and litter. In the undisturbed stands, with basal areas between 70 and 100 sq. ft./acre, available water was rapidly reduced, at about the same rate, reaching critical level early in July. Rainfall only moderately affected the position. Where the larger trees had been killed, and on the bared plot, available soil moisture remained relatively high (2–3 in.) with little difference in the lower layers. The importance of suitable stand treatment for regions with adequate annual rainfalls, but frequent summer drought, is stressed.

1173. Fichte oder Buche? Welche Holzart ist wasserwirtschaftlich wertvoller? (Zur dritten Aussprachetagung des Arbeitskreises 'Wald und Wasser' am 21 und 22 September.) **[Spruce or Beech? Which species is more valuable hydrologically? (3rd meeting of the 'Forest and Water' working group on 21 and 22 Sept.)]** *Holz-Zbl.* 81 (141), 1955 (1666–7). [G.]

Contains, *inter alia*, reports by *Eidmann* on experiments started in 1951 by the Forestry Research Station of Nordrhein-Westfalen near Hilchenbach (Siegerland) and by *Kirwald* and *Kleinenbroich* on investigations by the Ruhrtalsperrenverein in the catchment areas of Ruhr tributaries, into the relative advantages of the two species for the water economy of the region. In Hilchenbach, run-off was slightly greater under old Beech in winter, but only about half in summer compared with that under old Spruce on comparable sites. Initial interception was about equal, even in winter, but stem flow for Beech (tested during 4 summer months) was about 10 times that for Spruce. The Ruhr experiments, comparing precipitation with stream flow, have so far permitted of no new safe conclusions.

1174. KADAMBI, K. **A plan for forest stream-flow relations research.** *Indian For.* 81 (11), 1955 (677–89 + 1 photo).

Briefly surveys existing stream-flow research in other countries, and outlines the special problems waiting to be investigated in India, the factors to be considered in choosing sites, and the instruments and equipment needed.

1175. SCHIECHTL, H. M. Die Folgen der Entwaldung am Beispiel des Finsingtales in Nordtirol. **[The consequences of deforestation as instanced by the Finsingtal in the North Tyrol.]** *Zbl. ges. Forstw.* 73 (1/2), 1954 (13–28). 4 refs. [G.]

The author describes this 17-km.-long side valley of the Zillertal and its catchment area of 46 sq. km. Geologically it is chiefly quartz-phyllite, a rock that weathers and erodes easily. He traces and illustrates the reduction of forest cover from 33% to 25% between 1873 and 1951 through overcutting and consequent avalanches. Faulty location of clear fellings along the feeder valleys, and the damage done to their stream beds by skidding, aggravated the effect of a 20% annual overcut and turned them into torrents carrying masses of stone and gravel and causing great damage in repeated floods. Large-scale engineering and reforestation measures have begun to show results, but their eventual cost is likely to be nearly twice that of the total value of the timber extracted over the last 20 years.

1176. MATTYASOVSZKY, J. A talajvédelem időszerü kérdései. **[Current problems of soil conservation.]** *Erdö* 4 (1), 1955 (29–32). [Hu.]

Though the erosion maps now being prepared in Hungary on the scale of 1/200,000 and 1/75,000 do not show the forested areas, the survey data on degree of erosion, recent deposition, gully and wind erosion and nature of the parent rock will serve as a useful guide for future afforestation. Dimensions of earthwork constructions on 5–12% slopes for soils of various degrees of compactness are given and the use of these constructions below forest belts and above affected areas is recommended for all regions showing erosion phenomena.

1177. PARTOS, G. Erdögazdasági módszereink értékelése vízgazdasági szempontból. **[Silvicultural measures and the water economy [of Hungarian soils].]** *Erdö* 4 (1), 1955 (5–8). 6 refs. [Hu.]

The water requirements of some tree species are briefly reviewed. For hilly regions liable to water erosion, only gradual regeneration fellings at as long intervals as possible, cautious thinnings and strict control of grazing are advised. Droughty soils or sites lacking water should be afforested with species of low transpiration rate, such as Austrian and Scots Pine or possibly Oak and Robinia rather than with the more exacting Larch, Spruce and Birch.

1178. **Erosion control of Japan.** Forestry Agency, Tokyo. [*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/68, 1955. pp. 2.

1179. MORELLET, J. Les travaux de conservation des sols en Inde dans l'état de Hyderabad, District de Bidar. **[Soil-conservation works in the Bidar district of Hyderabad.]** *Bois For. Trop.* No. 44, 1955 (11–6). [F.]

Describes a method being used by the Indian Forest Service in Hyderabad to protect grasslands against erosion while keeping their grazing possibilities. Contour trenches are dug, refilled, and sown or planted with mixtures of tree species of moderate size. The spacing of the contour trenches is based on a formula in which the distance between trenches is expressed as a function of the gradient of the slope. Best results have been obtained with *Acacia arabica, Ailanthus excelsa, Albizzia lebbek, Cassia siamea, Dalbergia sissoo, Melia azadirachta* and *M. azedarach.* [Cf. *For. Abstr.* 13 (No. 2106).]

1180. FEAGAN, W. T. **The role of Australian forestry in watershed management.** *Aust. For.* 19 (1), 1955 (35–41). 8 refs.

Outlines the problems involved and subjects for future research.

1181. MONTIEL PINILLA, F. La lucha contra la erosión en la cuenca del rio Segura. **[The struggle against erosion in the basin of the Segura river.]** *Montes, Madrid* 11 (65), 1955 (349–54). [Span.]

An account of the successful control measures first begun in 1907. So far, 40,732 ha. have been reforested, after extensive construction of stone retaining walls, 0·5 m. high, along the contour. Particulars given for various parts of the basin include the following: Cuenca de Guadalentin: stone walls were built and 200 ha. planted with *Pinus halepensis*, *P. nigra*, var. *calabrica* and *P. pinaster*, and 1,000 ha. sown with the two former. Sierra de Espuña: at high altitudes on stony sites *Quercus ilex* was used; on sunny sites *Juniperus oxycedrus* and *J. sabina*, and on better soils, *Pinus nigra* var. *calabrica*. Between 900 and 1200 m., *P. pinaster* and *P. halepensis* were mixed with *Q. ilex*, and on shady sites *Q. ilex* was mixed with *Q. lusitanica*. Below 900 m., *P. halepensis* was used, while on moist sites *Ulmus campestris*, *Populus alba*, *P. nigra* var. *italica* and *Fraxinus excelsior* were planted. On erodible soils, stone walls were built. Guardamar and Elcho dunes fixation work was undertaken over 434 ha. of the former (chiefly on the right bank of the river) and 32 ha. of the latter. *Psamma arenaria* and *Ononis natrix* were planted, with *Mesembryanthemum crassifolium* on the slopes. Trees used in reforestation were *Pinus pinea*, *P. halepensis*, *Eucalyptus* spp., *Populus nigra*, *Platanus occidentalis* and *Phoenix dactylifera*.

14. Systematic Zoology

See also No. 1167.

145.7. Insecta. Entomology

See also Nos. 1767 *et seq.*, 2152 *et seq.*

1182. THALENHORST, W. Ein handlicher Insekten-Zuchtbehälter. **[A convenient breeding chamber for insects.]** *Z. PflKrankh.* 62 (10), 1955 (625–6). [G.] E.M.B.

The apparatus (illustrated) comprises a glass bottle filled with water, a cylindrical piece of wood with a hole large enough to fit over the neck of the bottle at the bottom but only 10 mm. in diam. at the top, and an open glass cylinder that fits over the wood and rests on a flange running round its base. Spruce twigs are placed in the breeding chamber, with their stems passing through the hole in the wood into the bottle.

1183. HEPBURN, G. A. **A new laboratory method for observing *Cryptotermes brevis*, Walker.** *Repr.* from *Journal of the Entomological Society of Southern Africa, Pretoria* 17 (2), 1955 (219–21). 3 refs. P.R.

1184. MORITSU, M. **Some interesting aphids living upon *Quercus*.** *Bulletin of the Faculty of Agriculture, Yamaguti University, Simonoseki* No. 4, 1953 (39–50). [E.] H.S.B.

A description of 6 Japanese species of the genus *Tuberculatus*, with an identification key.

1185. KOZLOVSKY, S. Contribution à l'étude morphologique et biologique de *Phyllocnistis suffusella* Zell. et *Lithocolletis populifoliella* Tr. **[Morphological and biological study of *P. suffusella* and *L. populifoliella*.]** *Ann. Éc. Eaux For., Nancy* 14 (2), 1955 (261–76 + 8 plates). 26 refs. [F.]

A study of two Poplar leaf-miners.

1186. FERREIRA, M. CORINTA, and FERREIRA, G. DA VEIGA. Entomologia florestal da Moçambique. Contribuição para o estudo dos insectos xilofagos. I Parte. Família Bostrychidae. **[Forest entomology of Mozambique. Contribution to the study of woodboring insects. Part I. Bostrychidae.]** Junta de Exportação de Moçambique, Lourenço Marques. 1951. pp. 170 + 4 maps + 23 plates. 59 refs. [Port.] L.S.

Information on Bostrychidae in general, systematics of the species of Mozambique, control measures, and a list of species of South and East Africa, citing authorities.

1187. BECHYNÉ, J. Notes sur les Chrysolinini (Coleopt. Chrysom.) de la Méditerranée orientale. **[Notes on the Chrysolinini of the eastern Mediterranean.]** *Bull. Res. Coun. Israel* 4 (4), 1955 (347–50). 41 refs. [F.] A.P.B.

Gives synonymy for 11 species published in the 'Prodromus Faunae Palestina' (Caire 1937) and notes on 14 species now ascribed to *Crosita* or *Chrysolina* and a key to a new subgenus *Diachalcoidea*.

1188. BROWNE, F. G. **Synonymy and descriptions of some oriental Scolytidae and Platypodidae (Coleoptera).** *Repr.* from *Sarawak Museum Journal, Kuching* (*n.s.*) 6 (5), 1955 (343–73).

The species described are mainly those found in the Malay Peninsula and Sarawak.

1189. THOMSON, M. G. **Sexing and reclaiming dried specimens of *Dendroctonus engelmanni* Hopk.** *Proceedings of the Entomological Society of British Columbia, Victoria* 51, 1954 (45). 1 ref. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 139.) L.S.

Describes a method of determining the sex of this species and of *D. pseudotsugae* externally by touch, and of reclaiming dried specimens by soaking them in a 0·5% solution of Na_3PO_4.

1190. BENSON, R. **The sawflies (Hymen. Symphyta) of Israel.** *Bull. Res. Coun. Israel* 4 (4), 1955 (351–6). 9 refs. A.P.B.

Gives collectors' localities, some host plants and other notes for 56 species which include one family and 36 species new for Israel.

1191. ROSS, H. H. **The taxonomy and evolution of the sawfly genus *Neodiprion*.** *For. Sci.* 1 (3), 1955 (196–209). 6 refs.

Gives a key to the ♀ adults (4 pp.), descriptive notes and a taxonomic clarification for 18 critical species, and a discussion of dispersal lines and of correlation with forest evolution. All but one are confined to N. America; one western species is

considered to have entered the eastern states by travelling west via Eurasia.

1192. BRENY, R. L'éclosion de l'oeuf de *Neodiprion sertifer* Geoffr. **[Hatching of *N. sertifer*.]** *Bull. Inst. agron. Gembloux* 23 (3), 1955 (260–8). 6 refs. [F.flem.e.g.] E.M.B.

Notes on the appearance of the egg a little before hatching and the different stages of hatching as observed in the field.

15. Animal Ecology. Game and Fish Management, Hunting, Shooting and Fishing

See also Nos. 1668, 1702, 1762–6, 1817.

1193. CAMPBELL, B. **The crossbill.** *Leafl. For. Comm., Lond.* No. 36, 1955. pp. 11. 19 refs.

Describes the appearance, feeding habits, distribution, and migration of *Loxia curvirostra* in Great Britain.

1194. BETTS, M. M. **The food of titmice in Oak woodland.** *J. Anim. Ecol.* 24 (2), 1955 (282–323). 32 refs.

The possible competition for food between the great tit and blue tit (*Parus major* and *P. caeruleus*) in Oak woodland, and their relationship with the coal and marsh tits (*P. ater* and *P. palustris*) were studied in the Forest of Dean by means of gizzard analyses. It was found that *P. major* took mainly adult insects, especially weevils, while *P. caeruleus* fed mainly on scale insects and small larval and pupal forms. *P. ater* showed a preference for small free-living insects and scales. The diet of *P. palustris* consisted of adult insects, scales, and some larval forms. Few spiders were eaten by any of the tits. *P. major* and *P. palustris* fed more on seeds and nuts than did the other species. Oak buds and gall tissues were found in large quantities only in *P. caeruleus*. Nestling foods of a brood of *P. major* and a brood of *P. caeruleus* included caterpillars for both species, but pupae extracted from curled leaves formed a much larger proportion of the diet of the latter. Measurements were made of the caterpillar and titmouse populations in a nest-boxed area (*a*) and an adjoining control area (*b*) in 1950 and 1951. The rate of predation by titmice on all defoliating caterpillars in (*a*) was about 1·4% in 1950 and 4·8% in 1951, while the corresponding figures in (*b*) were 0·9% and 3·2%. *From author's summary.*

1195. RUTHERFORD, W. H. **Wildlife and environmental relationships of beavers in Colorado forests.** *J. For.* 53 (11), 1955 (803–6). 9 refs.

A 3-year study of 2 comparable streams, one with 42 and the other with 10 acres of beaver ponds: under regular yield management beavers are beneficial in wildlife, fish, forage and watershed relations on suitable streams. Sites ruled out are high-altitude small streams unsuitable in gradient and food supply for long occupation and other rivers with unstable soils. Watershed requirements should be the basis of management and for permanent benefits population control is indicated. Food, water, soil and topography are the basic factors.

1196. GYSEL, L. W., and LEMMIEN, W. **The growth and wildlife use of planted shrubs and trees at the W. K. Kellog multiple use forest.** *Quart. Bull. Mich. agric. Exp. Sta.* 38 (1), 1955 (139–45).

An analysis of growth and wildlife management of 7 shrubs and small trees is presented, from plantings made in 1937–39. The species were *Amorpha fruticosa, Caragana arborescens, Cornus amomum, Rosa multiflora, Lonicera tatarica, Elaeagnus angustifolia* and *Sorbus aucuparia.*

16. General Botany

160. Plant Chemistry

See also Nos. 1138, 1145–6, 1156, 1216–7, 1332, 1560, 1563, 1591, 1699–1700, 1752, 1783, 1967 *et seq.*, 2140–2, 2239, 2250 *et seq.*

1197. BHATIA, K. K. **Foliar calcium of Teak.** *J. Indian bot. Soc.* 34 (3), 1955 (227–34). 23 refs. O.B.D.

Investigations were made on native Teak at Sagar to study: (1) variations in amounts of foliar Ca with respect to soil pH and exchangeable Ca in the soil, (2) variations in the uptake as affected by age, and (3) seasonal variations of foliar Ca. In the first two cases no definite correlation could be established; but a gradual tendency was found for the % of foliar Ca to increase with the advance of the growing season.

1198. NIELSEN, N., GRÖMMER, J., and LUNDÉN, R. **Investigations on the chemical composition of pollen from some plants.** *Acta chem. Scand.* 9 (7), 1955 (1100–6). 19 refs. [E.e.] [AB Kabi, Stockholm.] O.R.S.

Pollen from *Zea mays, Alnus glutinosa, A. incana* and *Pinus mugo* was examined. Pollen from *P. mugo* contained only 13% protein compared with about 25% in the other species, and had also a low content of water-soluble components. The different pollens showed considerable variation in contents of fats, ash, carbohydrates, S and P. No great differences could be found, quantitatively, between the amino acids in the different pollens. A study of the vitamin contents showed that *Z. mays* was rich in pantothenic acid and inositol, the *Alnus* spp. were rich in riboflavin and poor in inositol, and *P. mugo* was relatively poor in pyroxidine. Results are tabulated.

1199. PLOUVIER, V. Sur un cyclitol nouveau, le liriodendritol, isolé des *Liriodendron* (Magnoliacées). **[A new cyclitol, liriodendritol, isolated from *L. tulipifera*.]** *C.R. Acad. Sci., Paris* 241 (12), 1955 (765–7). 1 ref. [F.] O.R.S.

1200. PLOUVIER, V. Sur le sorbitol des Rosacées. **[Sorbitol in the Rosaceae.]** *C.R. Acad. Sci., Paris* 241 (18), 1955 (1220–2). 1 ref. [F.] O.R.S.

Sorbitol was found in all the Spiraeoideae, Pomoideae (including *Sorbus* spp., *Amelanchier* spp. and *Crataegus* spp.) and Prunoideae examined, and can be considered characteristic of these subfamilies. It was not found in the Rosoideae examined.

161. Physiology

See also Nos. 1124, 1166, 1260, 1299, 1319 *et seq.*, 1729, 1744, 1752, 2140–2.

1201. **List of papers presented at the Geneva [peaceful uses of atomic energy] conference.** *Sci. and Cult.* 21 (3), 1955 (130–8). E.M.B.

Includes under radiation-induced genetic changes and crop improvement, 4 titles; tracer studies (agriculture, silviculture, soils etc.) 11 titles: and physiology and biochemistry, 18 titles. [Cf. *For. Abstr.* 17 (No. 1117).]

1202. SCHÖNNAMSGRUBER, H. Studien über den Phosphathaushalt von jungen Holzpflanzen, insbesondere von Pappeln. **[On the phosphate uptake of young woody plants, particularly Poplars.]** *Mitt. württemb. forstl. VersAnst.* 12 (2), 1955. pp. 68. 56 refs. [G.g.]

Growth, dry-matter production, and P content of leaves throughout the growing season in relation to varying concentrations of phosphates in an otherwise nutrient-deficient medium, were investigated in 60-day-old seedlings of various Poplar hybrids, in 1-year cuttings of the 'Oxford' Poplar and 11 other tree species (all broadleaved except *Larix decidua*); and similarly, in media enriched with N, K, or Mg respectively, in 1-year-old seedlings of *P. tremula*. The general course of P uptake was traced for a number of Poplar hybrids and varieties with the help of radioactive H_3PO_4 (P^{32}). A correlation was shown between the P content of the leaves and that of the media, though for the very high concentrations tested on the Oxford Poplar the pattern was irregular. Addition of other nutrients, particularly Mg, increased the P uptake. For some species, e.g. Poplars and Elms, maximum dry-matter production was obtained by high P supplies; for others, e.g. Beech and Birch, by merely 'adequate' supplies; and for yet others, e.g. *Robinia pseudoacacia*, when there was hardly any P in the culture medium.

The experiments with P^{32} showed that both its uptake and excretion through the roots depended on light. Uptake usually reached a maximum at about 3 p.m. By day, the upper surfaces of leaves showed higher radio-activity; by night, the lower surfaces. The transpiration rate had no influence on uptake rate. Rate of translocation and quantities taken up varied considerably in different varieties, the former reaching e.g. 30–35 cm./hour in a *P. generosa* × *P. nigra* hybrid, against 10–15 cm./hour in *P. nigra*, var. *italica*. A connexion between speed of nutrient translocation and early height growth is tentatively suggested.

1203. WILL, G. M. **Removal of mineral nutrients from tree crowns by rain.** *Nature, Lond.* 176 (4494), 1955 (1180). 2 refs. [Forest Research Institute, Whakerewarewa, N.Z.]

A preliminary report on analysis of rain water collected under a 30-year *Pinus radiata* plantation shows that a large part of the K and Na returned to the soil under *P. radiata* is contained in the rainfall (21·5 and 81·4 m.e./sq. m. respectively, compared with 16·5 and 10·4 from litter). [Cf. *For. Abstr.* 13 (No. 61).]

1204. VEIHMEYER, F. J., and HENDRICKSON, A. H. **Does transpiration decrease as the soil moisture decreases?—With discussion.** *Trans. Amer. geophys. Union* 36 (3), 1955 (425–48). 41 refs. H.S.B.

Measurements were made, over an entire growing season, of moisture loss from the soil when Plum and Pine were grown in a tank sealed to prevent surface evaporation losses. The results indicate that the rate of moisture extraction by transpiration is not influenced by the amount of water in the soil, so long as this remains above wilting %. This conclusion is supported by evidence from field trials with Pine, Oak and Manzanita on a watershed area, and Apricot and Plum under cultivation. *From authors' summary.*

1205. ŽEMČUŽNIKOV, E. A., VERETENNIKOV, A. V., and KOTELJNIKOVA, A. P. Opredelenie transpiracionnoĭ sposobnosti kron sosny. **[Determining the transpiration capacity of Pine crowns.]** *Fiziol. Rast.* 2 (4), 1955 (397–9). 1 ref. [Russ.] [Laboratorija Fiziologii Rasteniĭ Lesotehničeskoĭ Akademii im. S. M. Kirova, Leningrad.] A.P.B.

Unless the trees are small, Ivanov's rapid weighing method necessitates the use of scaffolding to reach crown level. To avoid this, the authors used a Berkel-type balance, with dial graduations of 10 g. but readable to an accuracy of 5 g. with loads up to 14 kg., to weigh whole Scots Pine crowns from trees ca. 40 years old and ⩾ 10 m. high. Immediately after felling, the crown was severed (the cut surface and any accidental wounds being coated with paraffin wax) and suspended by a wire loop from the hook of the balance, suitably mounted in the actual stand. Weighings were made, mostly at 15-min. intervals, and hygrometer and anemometer readings taken. Results are graphed for 8 crowns—4 from a normal and 4 from a waterlogged site—at times from 11 a.m. to 1 p.m. on 3 days in July–Aug. Though half of the crowns showed a gradual decrease in transpiration loss, while half showed increased loss for the second 15-min. period and only then a decline, the trend of the curves was not correlated with moisture of site. Immediately after the last weighing (45 min. after the first) all needle-bearing twigs were snipped off as quickly as possible, put in weighed rubber bags and taken for weighing at a temporary laboratory, first in bulk and then of samples for determination of the weight of actual needles. From the results the authors calculated the transpiration per g. fresh needle weight per hour. Figures are tabulated for 30- and 45-min. exposure periods and compared with mean data obtained by Ivanov [see *For. Abstr.* 14 (No. 66)]. Most of the present figures are lower than those obtained by Ivanov. Of the three exposure periods, 15 min. is unreliable since 4 crowns showed increased transpiration in this period, and 30 min. gives better agreement than 45 min. with Ivanov's data. Taking the 30-min. figures, the crowns from the waterlogged site showed considerably higher transpiration rates than those from the normal site.

1206. IVANOV, L. A., and SILINA, A. A. Opredelenie transpiracionnogo rashoda lesa aktinometričeskim metodom v svjazi s ego èngergetičeskim

balansom v različnyh lesorastiteljnyh zonah. **[Determination of the transpirational loss of forest by the actinometric method, with reference to the energy balance of forest in different growth zones.]** *Fiziol. Rast.* 2 (4), 1955 (313–9). 11 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR, Moskva.] A.P.B.

In a previous paper [see *For. Abstr.* 14 (No. 67), 15 (No. 2258)], it was suggested that a discrepancy between the figures obtained by two methods (actinometric, and rapid weighing of cut twigs) for the total amount of water transpired by Birch during the growing season, might be explained by the neglect, in calculations made in the actinometric method, of some allowance for heat exchange between leaves and atmosphere. To verify this supposition, the authors measured leaf temperatures with a special thermo-electric thermometer, and, using a formula given by Brown and Wilson (*Proc. Roy. Soc., Lond.* 76 1905 (122)), calculated the necessary radiation factor for: (1) a mixed stand on the Derkul' Steppe, Ukraine; (2) pure Oak in the Tellerman forest, Voronezh; (3) Birch stands near Moscow. The numbers of measurements of leaf temperature were respectively 323, 178 and 177. In (1) and (2) mean leaf temperatures somewhat exceeded, and in (3) were somewhat lower than, air temperatures. With the appropriate correction, the actinometric gave figures differing from those of the rapid-weighing method by respectively + 6·2, − 6·1 and (for two Birch stands) + 3·7 and + 1·4%. These differences lie within the permissible limits of error. Previous data for Scots Pine in the moist zone (near Moscow) had shown a corresponding difference of 4–5% without applying any such correction, and it is probable that in this zone almost all the solar radiation absorbed is expended in transpiration. A table summarizes data on the energy balance of (1)–(3) and of two Pine stands near Moscow, under the entries: total (direct and diffuse) radiation in growing season; reflection from canopy, radiation not intercepted, and radiation absorbed (whole crown; shoots and branches; foliage), all in % of incident radiation; radiation absorbed by foliage during the growing season (in cal./sq. cm.); radiation expended in heat exchange with air (in cal./sq. cm.) and in transpiration (in cal./sq. cm. and in % of radiation absorbed); and transpiration (mm./ha.) calculated by actinometric and weighing methods.

1207. ZGUROVSKAJA, L. N., and CELJNIKER, JU. L. O vlijanii poliva posle dliteljnoĭ zasuhi na transpiraciju i sostojanie sosuščih korneĭ u drevesnyh porod v Derkuljskoĭ stepi. **[The influence of watering, after a prolonged drought, on transpiration and the condition of absorbing roots in woody species on the Derkul' steppe.]** *Fiziol. Rast.* 2 (4), 1955 (346–53). 11 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR, Moskva.] A.P.B.

The studies described were made in 1954 in a mixed 17-year plantation of *Quercus robur*, *Fraxinus pennsylvanica* and *Acer platanoides* at Derkul', Voroshilovgrad district, Ukraine. On 23 June, 14 July, and 3 and 16 Aug., groups consisting of one tree of each of these species were watered (300 litres/tree, wetting the soil to a depth of 30–40 cm.), a fresh group being selected on each occasion in order to avoid the possible influence of previous watering. By the first date, severe drought had lasted ⩾ 1 week, but the top 100 cm. of soil had reached the wilting coefficient; the remaining dates fell after continued drought of ca. 4, 6 and 8 weeks. Transpiration was measured for watered trees and controls before and for several days after watering (5–10 measurements daily by Ivanov's rapid weighing method). Root samples were taken for anatomical study in late June and before and after the third watering.

The soil dried out in all cases, to approximately its initial state, 6 days after watering. Watering was always followed by increased transpiration, but the rapidity and magnitude of this increase varied with date of watering and species; the reaction was the quicker and stronger, the shorter the preceding drought period, and *F. pennsylvanica* showed the most marked response. The anatomical studies indicated that in prolonged drought the absorbing root-tips enter a state of rest characterized by the appearance of a yellowish-brown coloration and the contraction of protoplasm away from the walls in meristematic cells, and suberization of external cells of meristem and cortex. The primary cortex does not die, and not all of the exoderm cells are suberized, so that the possibility remains of some little water uptake. By late July–Aug., all root-tips were in this condition. After watering, simultaneously with the rise in transpiration, restoration of the normal internal state in the root-tips began; they resumed growth 4–5 days after watering, and individual roots continued to grow for as long as 5–7 days after the soil had dried out again to the wilting coefficient. On the basis of these results it would seem that the reason for the absence or feebleness of any rise in transpiration, in the species studied, after light summer rains, is that the latter supply insufficient moisture to relieve root dormancy.

1208. SILINA, A. A. Transpiracija drevesnyh porod Tellermanskogo lesničestva. **[The transpiration of woody species in the Tellerman forest.]** *Fiziol. Rast.* 2 (4), 1955 (364–72). 7 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR, Moskva.] A.P.B.

A continuation of studies by the author and collaborators in different localities [see *For. Abstr.* 16 (No. 83)], using Ivanov's rapid weighing method. The present paper covers measurements made during the 1953 growing season on (*a*) pure 10-year Pedunculate Oak, and (*b*) a mixed 12-year stand with Aspen predominating and Oak, Ash, Elm, Norway and Field Maples, Lime (*Tilia cordata*) and Hazel as associates. A few data are also given for 3-year natural regeneration of Ash, Oak and Norway Maple under closed canopy, and for Oak and *Caragana arborescens* in a nursery. Results are given in tables (stating in most cases the number of determinations made) and graphs, and are discussed under the heads: transpiration of the individual species; influence of atmospheric factors; and stomatal regulation of transpiration. High correlation of transpiration with air temperature was observed only for trees not suffering from suppression. All species showed a rise in transpiration

with increasing wind velocity or decreasing relative humidity, and all showed marked differences in transpiration with differing degrees of stomatal closure. Using the means of the transpiration rates measured, along with figures from plot enumerations, determinations of leaf weight on sample trees, and hours of transpiration (monthly means based on direct observations, with allowances for day-time rains and for time lost in (*a*) owing to damage to the first flush of leaves by a late frost), the author estimates the total transpiration for the growing season (mid-May to mid-Sept.) as equivalent to 218 and 397 mm. respectively for (*a*) and (*b*). Data furnished by a hydrological laboratory give the rainfall passing through the canopy as 151 mm. for the same period; hence both stands must cover their water requirement during the growing season partly from reserves accumulated at other seasons.

1209. Ipekdžijan, V. M. O zimneĭ transpiracii pobegov molodyh dubkov v svjazi s ih zimostoĭkostjju. **[The winter transpiration of shoots of young Oaks in relation to their winter-hardiness.]** *Fiziol. Rast.* 2 (4), 1955 (373–7). 19 refs. [Russ.] [Institut Fiziologii Rasteniĭ im. K. A. Timirjazeva Akademii Nauk SSSR, Moskva.] A.P.B.

Gives the results of tests on material from Oak nest-sowings on the Ergeni Hills, Stalingrad province, to ascertain whether winter transpiration was likely to be a factor in the high winter mortality of the seedlings in this region. Comparison of the water content of various parts of first-year seedlings in summer-autumn and winter showed only small decreases of water during the winter. In Feb. 1953, shoots (*a*) 1 and (*b*) 2 years old were cut from 3rd-year seedlings, and after treatment of cut surfaces with paraffin wax, were exposed in the open for 18 days (2–20 Feb.), with daily weighings. The mean daily water loss, based on initial green weight, was 0·33% for (*a*) and 0·18% for (*b*). In the first 3 days the shoots even gained a little weight, a fact attributed to absorption of liquid water from precipitation, the mean daily temperatures being positive, in contrast to the minus temperatures of the remaining 15 days. At the end of the test the 1-year shoots still contained 34% of water: the contents in wood and bark were respectively 22 and 41%, from which it appears that the water content of the bark was maintained by drawing on supplies in the wood. One-year shoots of *Morus* sp. showed a mean daily loss of 0·54% over the same period.

Data are also given for similar transpiration tests lasting from March 23 or 26 till April 7, 1953, on shoots from 1-, 3- and 10-year Oak, nursery plants of *Rhus cotinus* and *Acer tataricum*, and an adult *Ulmus foliacea*; these showed mean daily water losses of respectively 2·6, 1·7–2·2, 1·4–1·7, 1·6, 1·4 and 1·8%. Over this period the water content of the Oak plants from which the shoots were taken, did not decrease, indicating that active water uptake occurs long before flushing.

It is concluded that water deficiency could not have been a cause of deaths during this winter, though deaths from this cause might perhaps occur with a less favourable moisture supply, e.g. after a droughty summer. The threat would be most serious to young plants, since with increasing age there are increases both in the degree of natural protection against water loss and the amount of water stored in the stem and roots.

1210. Decker, J. P. **A rapid, post-illumination deceleration of respiration in green leaves.** *Plant Physiol.* 30 (1), 1955 (82–4). 6 refs. O.R.E.

Single (undetached) leaves of various species, among them *Liriodendron tulipifera*, *Fraxinus americana* and *Quercus muehlenbergii*, sealed in a leaf chamber, were (*a*) illuminated until the CO_2 concentration of the surrounding air reached compensation point, (*b*) then darkened, and the subsequent changes in CO_2 concentration recorded. The evolution of CO_2, rapid at first, decelerated rapidly. For hybrid tobacco the mean initial rate was ca. 5·4 times that of the stabilized rate reached 6 to 9 minutes later. *L. tulipifera* and *F. americana* showed a similar, if less marked response, whereas for *Q. muehlenbergii* the effect was slight and inconsistent [figures not given]. Control tests showed that these changes in the respiration rate were not caused by the differences in temperature in the darkened or illuminated leaf chamber.

1211. Tranquillini, W. Die Bedeutung des Lichtes und der Temperatur für die Kohlensäureassimilation von *Pinus cembra*-Jungwuchs an einem hochalpinen Standort. **[The function of light and temperature in the CO_2 assimilation of young *P. cembra* on a high alpine site.]** *Planta, Jena* 46 (2), 1955 (154–78). Many refs. [G.g.] O.B.D.

[Cf. *For. Abstr.* 16 (No. 1402).] Measurements were made in autumn with the help of an infra-red absorption recording instrument of the net assimilation of CO_2 by sun- and shade-plants of *P. cembra* 10–20 cm. high. The location was in the Ötztal (Tyrol) at ca. 1940 m. above sea-level. Light intensity and needle temperatures were also recorded. Light intensity necessary to reach compensation point depends on temperature and the adaptation of the plant to the site; at average September temperatures it is 150 lux for shade plants and 500 for sun plants. The net assimilation of the shade trees was always regulated by the light intensity; only on overcast days was assimilation by the sun trees similarly regulated. The shade trees, however, made better use than the sun trees of the light up to 40,000 lux, particularly of the weakest lights. Curves illustrating the influence of light on different days vary considerably because of the influence of temperature. Optimum temperatures for sun- and shade-trees for net assimilation lie between 10 and 15° C. and do not seem to vary under different light conditions. Needle temperatures in the shade were much lower than in the sun, where even in autumn they often exceed the optimum (up to 30° C.). For these reasons, therefore, Pines on sunny aspects in natural conditions do not attain the maximum CO_2 net assimilation reached by the shade trees—not only on overcast days but also under strong direct light. Net assimilation begins at 5° C., rises steeply to an optimum (10–15° C.), and falls thereafter with rising temperature. At ca. 35°, CO_2

begins to be given off. Within a range — 5° to + 35° in autumn young *P. cembra* can accumulate reserves. Range of temperature necessary for its bare existence is — 10° to + 50° C. On shady sites daily production of living substance by young *P. cembra* is definitely controlled by light factors, but the light on shady sites in the area studied was sufficient for the attainment of more than the average yearly increment. Minimum light intensity necessary for the survival of *P. cembra* is a daily average of ca. 10,000 lux-hours in the snow-free growth period, i.e. ca. 2·5% of Sept. daylight in the open. Light exceeding this amount is sufficient to cause growth. *From author's summary.*

1212. SUHOV, G. V. Fiziko-himičeskiĭ mehanizm smoloistečenija. [**The physico-chemical mechanism of resin flow.**] *Gidrol. lesohim. Prom.* 8 (6), 1955 (12–3). 3 refs. [Russ.] P.R.

A special apparatus has been designed for measuring the resin flow from fresh sapwood wounds. A shallow bore-hole (1·8 cm. diam., 0·5 cm. deep) in the stem was hermetically sealed by a rubber stopper having a cavity (of like diameter but greater depth) covered by a highly elastic membrane. A burette was inserted vertically into the side of the stopper so as to connect with the cavity and the whole was then filled with water. Resin accumulating on the tree side of the membrane distends it into the stopper cavity, causing displacement of the water column, which thus serves as a measure of the resin flow. Results of measurements (lasting up to 48 hours) on 6 Scots Pine seed trees (height 30–35 m., d.b.h. 60–80 cm., bore-holes 1·5 m. above the root collar) in the Moscow region showed that the resin flow agrees very well with the equation $V = V_m\ (1 - e^{-kt})$, where V is the volume of resin discharged in time t, V_m is the total volume of resin exuded, and k is a constant which, for these trees, averaged 29×10^{-6} sec.$^{-1}$. The same equation served for the results obtained with 10 Pine trees (site quality II) in the Gorki region, but k had the value 59×10^{-6} sec.$^{-1}$.

1213. BORMANN, F. H. **The primary leaf as an indicator of physiologic condition in Shortleaf Pine.** *For. Sci.* 1 (3), 1955 (189–92). 8 refs.

The primary leaf in Pine is (*a*) needle-like in the seedling and becomes (*b*) scale-like on shoots of the second season. When plants are topped, coppiced or have their crowns burned, reversions to (*a*) may occur. Coppice shoots 6–12 in. long, taken from topped 4-year plants, were separated into lots carrying exclusively (*a*)-type leaves and somewhat harder shoots bearing nearly equal numbers of (*a*) and (*b*). One half of each lot was treated with 0·3% indole-butyric acid. This had a distinctly depressing effect on both callusing and rooting in both cases, in contrast with results of workers dealing probably with shoots carrying leaves exclusively of the (*b*) type [cf. *For. Abstr.* 6 (p. 9)]. Of the shoots bearing only (*a*), 88% callused and 32% rooted; the corresponding %s for those having half their leaves of the (*b*) type were 48 and 20. A loss of rooting response coincident with the change in form of the primary leaf is indicated.

1214. OSBORNE, D. J. **Acceleration of abscission by a factor produced in senescent leaves.** *Nature, Lond.* 176 (4494), 1955 (1161–3). 10 refs. [Department of Agriculture, University of Oxford.]

Experiments with many evergreen and deciduous species have demonstrated that during the period of autumnal leaf-fall, substances inducing abscission are of widespread occurrence in the petioles of senescent leaves. Comparisons have been made of the diffusate from the petioles of yellow leaves which have just completed abscission and that from green leaves still attached to the branches. The results (tabulated) obtained for *Ulmus glabra*, *Aesculus hippocastanum*, *Ligustrum ovalifolium*, and *Rhododendron sutchuense* showed that acceleration of abscission resulted from the application of the diffusate from abscinded leaves of the different species to bean 'explants'. The diffusate from the green leaves of the deciduous species in the autumn, when such leaves are fast approaching senescence, also accelerated abscission, but to a lesser extent. In the evergreen species (Privet and Rhododendron), leaves in their first year of growth do not normally undergo abscission, and it is noteworthy that the diffusate obtained from the petioles of such green leaves was not found to accelerate abscission. It was only the diffusate from senescent leaves in their 2nd or 3rd year of growth that appeared to be active. Diffusates from the first-year leaves of several Rhododendron species were, in fact, found to delay rather than hasten abscission. On the basis of the present results, it is proposed that leaf abscission may be controlled not only by endogenous auxins, but also by some substance or substances that are produced as the leaf matures, reaching a maximum at senescence. The question whether this factor is itself active in inducing abscission, or whether it functions indirectly by altering the level of the effective auxins in the abscission zone, must await the results of further investigations.

1215. KATO, R., and YOKOYAMA, K. [**Seasonal change of osmotic pressure and pH of the cell-sap in the leaves of the European Spruce (*Picea abies*).**] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 3, 1955 (23–7). 11 refs. [Jap.jap.e.]

The study was based on 10 trees and 2 samples of each season's foliage, with colorimetric tests. A graph, with English captions, shows over a period of 20 months (including 2 growing seasons), the march of (*a*) osmotic pressure and (*b*) the pH of the cell sap with (*c*) the temperature of the air. Both (*a*) and (*b*) are negatively correlated with (*c*), temperatures of 0 and 5° C. seeming to be critical in their effect on (*a*) in Norway Spruce as they are in indigenous conifers. In freshly opened leaves (*a*) was 7–8 atmospheres and, through the summer, minimum, optimum and maximum (*a*) were 12, 14–15 and 23·4 atm. respectively. The high winter values of pH for leaves in their first and second growing seasons were 3·0 to 4·4 and 3·6 to 4·6 respectively, the maxima occurring in October. Higher values than those observed at Heidelberg [cf. *For. Abstr.* 12 (No. 97)] are ascribed to differences in air temperature and precipitation.

1216. KURIMOTO, T., TAKADA, H., and NAGAI, S. **Physiology of *Metasequoia glyptostroboides* and related species of conifers. I. Osmotic value and salt composition [content] of leaf saps.** *Journal of the Institute of Polytechnics, Osaka City University, Osaka* (*Ser. D*) 5, 1954 (55–65). 16 refs. [E.e.] L.S.

Measurements of the osmotic values of expressed leaf saps revealed rather greater seasonal and diurnal fluctuations in *Metasequoia* than in related species of conifers growing under somewhat similar field conditions. Determinations of the corresponding fluctuations in the K and Cl contents of the saps indicated characteristic differences between the various species as regards both actual concentrations and fluctuations in osmotic values. Ageing of the leaves was generally accompanied by a gradual accumulation of Cl, especially in the second-year leaves of evergreen species; the highest Cl concentrations were found in *Metasequoia* and could contribute up to 36% of the osmotic value of its sap. The K concentration also reached a higher value in this species, but compared with other species the K/Cl ratio was generally lower. It is concluded that both seasonal and diurnal changes in the osmotic value of *Metasequoia* are affected not only by the sugar content of the sap but also by the high content of K and Cl. In this respect, the osmotic relations of *Metasequoia* are different from those of other conifers. [Cf. *For. Abstr.* 15 (No. 1079).]

1217. SAKAZAKI, N., IHARA, Y., TACHIBANA, Y., NAGAI, S., and TAKADA, H. **Physiology of *Metasequoia glyptostroboides* and related species of conifers. II. Comparative studies of salt tolerance.** *Journal of the Institute of Polytechnics, Osaka City University, Osaka* (*Ser. D*) 5, 1954 (67–80). 19 refs. [E.] L.S.

The effect of variations in salt content, osmotic value and pH of culture solutions on osmotic values and salt content was tested for (1) *M. glyptostroboides* plants raised from cuttings the preceding summer, (2) maize, (3) tomato, (4) beet, and (5) *Atriplex*. No significant difference was found in the reactions of (1) and (2) tested at pH 4·8 and 6·2, and pH values were allowed to vary within this compass. All plants appeared healthy when growing in Knop's basal solution for a week but varying degrees of wilting were noted 1–2 weeks later, in solutions enriched with NaCl or KCl. Other reactions to K, Na, and Cl enrichment are described. Capacity to regulate the K level appeared to be closely related to the capacity for osmotic regulation, and if the former is kept within a certain range, the plants remain unharmed even if the Na level is raised. Fluctuations in the Na/K ratio rather than the ratio itself are suggested as significant for salt tolerance. By this criterion, the plants tested ranked as follows: (5) > (4) > (3) > (1) > (2).

1218. TORIYAMA, H. **Observational and experimental studies of Sensitive Plants. I. The structure of parenchymatous cells of pulvinus. II. On the changes in motor cells of diurnal and nocturnal condition.** *Cytologia, Tokyo* 18 (4), 1953 (283–92); 19 (1), 1954 (29–40). 58 refs. [E.e.] C.G.B.

A study of the structure of the motor cells of *Mimosa pudica* from the cytophysiological and microchemical points of view, and of the difference in the changes in these cells under diurnal and nocturnal conditions. *From author's summary.*

1219. ŠČERBAKOV, I. P. Primenenie poluprovodnikovogo èlektrotermometra dlja izmerenija temperatur v tkanjah dereva. **[Use of a semi-conductor electric thermometer for measuring temperatures in tree tissues.]** *Fiziol. Rast.* 2 (4), 1955 (392–6). 3 refs. [Russ.] A.P.B.

The main advantages of this method are the small size of the units (thermistors) and the consequent reduction of damage to the tissues into which they are inserted, the relatively high accuracy (to 0·1° C.), and, especially in the Siberian winter, the possibility of taking readings in a room at a considerable distance from the object of study. The author, working in Yakutsk, has tried the method for measurements of internal stem temperatures at hourly intervals for a period of 24 hours (17/18 Sept. 1954) in one tree each of *Pinus sylvestris* and *Betula platyphylla* (d.b.h. respectively 22 and 14 cm.), with readings of temperatures in the cambial zone (N. and S. sides), at 25 mm. within the wood, and at the centre of the stem. Results are shown in a table and graphs. As the lowest stem temperature at this time was − 2·8°, no freezing of water in the tissues could have occurred, and the stem temperature curves were the same—though smoother and with some lag—as those for the air. At mid-day, cambial temperatures on the N. and S. sides differed by 2·6° in Pine and 12·8° in Birch. On the S. side, cambial temperatures at 1–2 p.m. exceeded air temperature by 3·5 and 10·2° respectively, and it is evident that in summer this difference might be very considerable. The more pronounced temperature variations in Birch are ascribed to its thin, relatively dense bark.

1220. KLINCOV, A. P. Izmenenie temperatury dereva pod vlijaniem rubok uhoda. **[Change in the temperature of tree stems under the influence of tending operations.]** *Fiziol. Rast.* 2 (4), 1955 (341–5). 6 refs. [Russ.] [Uraljskiĭ Lesotehničeskiĭ Institut, Sverdlovsk.] A.P.B.

Stem temperatures in the cambial region, at 1 m. height on the N. side of the stem, were measured by means of Cu/constantan thermocouples in Norway Spruce on plots in the Lisinsk forest: (1) one tree each in a 13- to 15-year thicket stand—(*a*) untouched, with overtopping Birch, Aspen and Grey Alder; (*b*) liberated from overtopping hardwoods; (2) one tree each in a 40- to 45-year polewood—(*c*) unthinned, density 0·9; (*d*) thinned, density 0·6. For (1), noon temperatures of cambial tissues and air are tabulated for various days from 4 June to 6 Aug., when (*a*) was also freed of the hardwoods, and thereafter until 28 Aug., along with graphs of half-hourly temperature readings for the two days 1 and 9 Aug. On days with medium to slight cloud, readings for (*a*) were always 3–7° C. below those for (*b*) until (*a*) was liberated, after which the differences were mostly slight. For (2), the figures given are hourly readings on 11 July and 11 Aug., (*c*) having

been thinned to a density of 0·5–0·6 in the interval. On the former date, temperatures for (*c*) were only 1·8–0·3° lower than those for (*d*), and on the latter date only insignificant differences were registered. The smaller differences in (2) are ascribed to the thicker bark at this age, and also to the reduced access of direct sunlight to stems and soil.

1221. PETROV, P. I. O temperaturnom režime drevesnyh stvolov. [**The temperature régime of tree stems.**] *Bot. Ž.* 40 (4), 1955 (584–7). 3 refs. [Russ.]

Studies were made with ordinary thermometers inserted mostly at 1 m. height and to a depth of 10 cm. into the stems of Norway Spruce, Aspen and Birch trees in a forest lying at ca. 56° N., 33° E. Readings were taken for all 3 species in (*a*) uneven-aged, 30- to 80-year Spruce forest of density 0·7–0·8, and for isolated trees of the first two in (*b*) a forest glade. For Spruce in (*a*) the thermometers were not broken by frost, and readings were possible in winter, but for the hardwoods only the frost-free period was covered. Some of the data obtained are given in a graph of the temperature variations throughout the days 10–13 June, and in a table of mean daily temperatures for clear weather in June, July and Aug. and for overcast weather in July. For (*b*) the amplitude of temperature variations in the course of summer days was > 7° for Spruce but scarcely 3° for Aspen. In (*a*), with air temperatures varying in the course of the day from 12 to 27°, the corresponding temperature variations in the stems were: Spruce 16–19·8°, Birch 11·1–14·5°, and Aspen 10·1–13·4°. For the whole of the summer observations, Spruce showed temperatures 3–7° higher than Birch and 4–9° higher than Aspen, and the extreme values occurred 5–6 hours earlier than in the two latter. Correlation coefficients for stem and air temperature were positive for Spruce and negative for the hardwoods. It is inferred from the data that in hardwood forest the balance of heat exchange between stems and air should favour cooling of the latter, but in Spruce forest the reverse. In (*b*) some further temperature measurements were made in the Spruce stem at various depths: for 14–16 June these showed means of 16·1° at 1 cm., 16·4° at 5 cm., and 14·8° at 12 cm. depth. Readings were also taken for Spruce at 1 and 10·5 m. height on a series of dates in Dec. and Jan.: these indicated that the temperature of the butt was usually a little higher than that of the upper stem.

1222. HAARLØV, N., and PETERSEN, B. B. Temperaturmålinger i bark og ved af Sitkagran (*Picea sitchensis*) med særlig henblik på temperaturen i gångsystemer af *Hylesinus* (*Dendroctonus*) *micans*. [**Temperature measurements in bark and wood of *P. sitchensis* with particular reference to the temperature in tunnels of *D. micans*.**] *Forstl. Forsøgsv. Danm.* 21 (1), 1952 (43–91). 28 refs. [Dan.dan.e.]

Measurements of temperature in bark, wood and roots of *P. sitchensis* and *Pinus mugo*, and of soil and air temperatures, were made from 11 to 30 July, 1951 at Nystrup. On a cloudless day, bark temperatures of a Spruce in a sparsely populated section of the plantation reached their maxima at 11.30 a.m. on the S.E. side of the trunk, at 2 p.m. on the S. and at 5.30 p.m. on the S.W., which had the highest temperature of any of the positions (38° C.). Bark temperatures were above air temperatures. Wood temperatures were lower than bark temperatures and reached a maximum later; at night there was no difference between bark and wood temperatures. On cloudy days differences between bark temperatures on different sides of the tree and wood temperatures were very much less. Shading by neighbouring trees was found to cause a sharp drop in bark temperature. In cloudy weather temperatures in smooth and scaly bark were similar, but in direct sunshine they were considerably higher in smooth bark. Temperatures at midday on a cloudless day were considerably higher in the exposed root and the curve between root and stem than in the vertical stem. Air temperature was lower in dense than in open stands. Temperatures were higher in litter than in mor or sand, those in sand being lowest; litter temperatures were reduced by cloud and shading, and were lower in dense stands. Root temperatures were similar to those of the soil and, except in exposed roots, below those of the stem. Temperatures of trees in heavily thinned stands were much higher than those in lightly thinned stands; temperatures of trees in dense stands were below air temperature. Temperatures in tunnels of *D. micans* were similar to those in sound bark. Temperatures in *Pinus mugo* were similar to those in Sitka Spruce, differences being attributable to differences in tree size; trees with smaller diameters heated and cooled more rapidly but those with larger diameters reached higher maximum temperatures. In dead trees of both species in sunshine, temperatures rose more rapidly and reached higher levels than in living trees. Graphs, tables and photographs have English legends.

163. Embryology

See also Nos. 1269–70, 1481.

1223. SOUÈGES, R. Embryogénie des Papilionacées. Développement de l'embryon chez le *Sophora japonica*. [**Embryogeny of the Papilionaceae. Development of the embryo of *S. japonica*.**] *C.R. Acad. Sci., Paris* 241 (14), 1955 (833–5). 4 refs. [F.f.] O.R.S.

The embryo development is illustrated by drawings. Its relationship to that of other Papilionaceae is discussed.

164. Morphology

See also Nos. 1207, 1213, 1269–71, 1281, 1299, 1927.

1224. RICHARDSON, S. D. **The influence of rooting medium on the structure and development of the root-cap in seedlings of *Acer saccharinum* L.** *New Phytol.* 54 (3), 1955 (336–7 + 5 photos.) 3 refs. O.R.S.

Roots of first-year seedlings grown in a loamy soil showed normal structure and life history. In water cultures, however, the root cap was entirely absent or limited to a loosely aggregated sheath only a few cells thick. Preliminary observations indicate that in these conditions no new root-cap cells are produced and the sheath observed represents the

remnant of the original cap which disintegrates when the seedlings are transferred to water cultures. In seedlings grown in gravel the production of new root-cap cells was normal but instead of a continuous loss of individual cells as the root grew through the medium, the outer cells dried and turned brown without becoming separated from each other; the cap was shed as an entire unit, revealing a new cap underneath, and the cycle was repeated. The development of the root-cap in gravel is illustrated.

1225. SMITHSON, E. **Development of winged cork in *Acer campestre* L.** *Proc. Leeds phil. lit. Soc.* (*sci. Sect.*) 6 (2), 1952 (97–103). 4 refs. O.R.S.

Plants of *A. campestre* showing cork wings are irregularly distributed amongst plants with unwinged twigs. Shoots typically have 6 wings and the splits between them follow the course of the trace bundles and alternate in successive internodes. Winging appears to be related to vigour, as shoots with most extension and most radial growth tend to have greater depth of periderm, and asymmetrical shoots have wider wings on the side of greater radial growth. In trace-bundle sectors: (*a*) production of periderm lags at first but finally attains the greatest depth; the shorter tangential walls of the cells indicate more cell division; (*b*) the vascular cylinder expands most, and such bundles are normally capped by two arcs of phloem fibres; it is on the radius of the gap between these two arcs that the periderm splits. The splits extend inwards as far as a layer of thicker-walled cork cells with very short radial walls produced at the end of the season. *From author's summary.*

1226. SMITHSON, E. **Development of winged cork in *Ulmus* × *hollandica* Mill.** *Proc. Leeds phil. lit. Soc.* (*sci. Sect.*) 6 (4), 1954 (211–20). 6 refs. O.R.S.

× *U. hollandica* is characterized by bearing, particularly on sucker and stool shoots, longitudinal periderm wings, most commonly 4 in number; the more vigorous the shoot, the deeper the wings. The splits between the wings on any internode usually lie on the radii of those portions of the vascular cylinder of the stem containing the 3 traces of the next higher leaf, and on that of the main trace of the next higher leaf on the opposite side of the stem. This condition appears to be due to the greater peripheral increase of these trace sectors, particularly during primary growth, compared with that of the rest of the vascular cylinder. Variations in the direction and number of wings may be related either to variation in the size or in the course of the lateral traces, or to the level at which the main trace forks. Secondary splits in the original complement of wings may also lead to an increased number of wings. The findings in *Ulmus* agree in general with those in *Acer campestre* [cf. preceding abstract] where differential tangential vascular expansion also seems to be the main factor in determining the position of regular longitudinal splits in the periderm. *Author's summary.*

1227. YAMAZAKI, T., IWAMURA, M., and OGASAWARA, K. Die Untersuchungen über Rassen von japanischen Rotkiefern. (III). Die morphologische Veränderung der Nadeln von Kiefern im Baumalter. [**Investigations on races of *Pinus densiflora*: (III). Morphological changes in Pine needles in connexion with tree age.**] *Scientific Reports of the Saikyo University, Kyoto: Agriculture* No. 5, 1953 (155–63). 19 refs. [G.g.] L.S.

In the course of —so far inconclusive—investigations into the existence of morphological differences in Pines from different habitats, i.e. the existence of climatic races, it was found that needles of this species varied with the age of the tree. Needles were collected from (*a*) 1-year-old seedlings, (*b*) 3-year-old seedlings, and (*c*) 23-year-old trees of varied provenance, from (*a*) and (*c*) in winter, from (*b*) in summer. [Mean] lengths and widths were smallest in (*a*) and greatest in (*b*) while the length/width ratio, was greatest in (*b*) and smallest in (*c*). The [mean] number of stomata increased with age, while that of resin ducts and endoderm cells was smaller in (*b*) than in (*a*) and greatest in (*c*). The 1-year seedlings, because of the smaller surface of their needles and the greater number of resin ducts, are presumed to be hardier than the 3-year-old and hence potentially better planting material.

1228. CAMPO [-DUPLAN], M. VAN. Quelques pollens d'hybrides d'Abiétacées. [**Pollen of hybrids in the Abietaceae.**] *Z. Forstgenet.* 4 (4/5), 1955 (123—5). 4 refs. [F.g.e.]

Investigations on pollen of the artificial hybrid × *Abies vilmorini* (=*A. cephalonica* × *A. pinsapo*) revealed a considerable range of variation, from pollen grains with large air-sacs to those without any. Investigations on *Tsuga longibracteata*, *T. crassifolia* and *T. hookeriana* revealed unusual features, from which their hybrid character must be concluded. On the distal side these pollen grains have large air-sacs and therefore one specific parent must be assumed which normally possesses pollen grains with air-sacs. The 3 forms of *Tsuga* are re-named as follows:— × *Tsugo-Keteleeria longibracteata*, × *Tsugo-Picea hookeriana* and × *Tsugo-Piceo-Picea crassifolia*. [Cf. *For. Abstr.* 12 (No. 959).] *From author's summary.*

1229. COOKSON, I. C., and PIKE, K. M. **The pollen morphology of *Nothofagus* Bl. subsection *Bipartitae* Steen.** *Aust. J. Bot.* 3 (2), 1955 (197–206 + 1 plate). 18 refs. O.B.D.

Descriptions of the pollen of 12 New Guinea and 3 New Caledonian species.

1230. ERDTMAN, G. **Pollen morphology and plant taxonomy in some African plants.** Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (405–12). 4 refs. [E.it.]

Cites the correct allocation, by pollen characters alone, of a number of unnamed *Macrolobium* spp. to their place of origin (America or Africa). On the same grounds the author would discount the separation of *Gilbertiodendron* and *Pellegriniodendron* from this genus.

1231. COETZEE, J. A. **The morphology of *Acacia* pollen.** *S. Afr. J. Sci.* 52 (1), 1955 (23–7). 14 refs. A.P.B.

A study of the pollen morphology of 28 S. African and 31 Australian species of *Acacia*.

165. Phylogeny, Evolution. Heredity, Genetics and Breeding; Variation

See also Nos. 1227–8, 1270, 1299, 1341 *et seq.*, 1462, 1481, 1933, 2277.

1232. BOUVAREL, P. La sélection individuelle des arbres forestiers (résineux) à la Station de Recherches et expériences forestières. **[The individual selection of coniferous forest trees at the Forest Research Station [, Nancy].]** *Rev. for. franç.* 7 (11), 1955 (785–807 + 17 photos). [F.]

Describes the tree-breeding programme, with special reference to the methods used in selecting trees (*a*) to provide seed, (*b*) as a source of scions for grafting in seed orchards, with specifications for 'plus' trees, and notes on methods of gathering material for grafting.

1233. ARNBORG, T., and HADDERS, G. **The society for practical forest improvement.** *Svensk SkogsvFören. Tidskr.* 51 (2), 1953 (172–82). 11 refs. [E.]

Describes the work of the Society [*Sällskapet för praktisk skogsförädling*], founded by 10 forest companies in 1941, in selecting and propagating plus trees and establishing seed orchards; classifying forests for seed collection; establishing nurseries; studying forest types; research on exotics; and information services.

1234. QUERENGÄSSER, F. Über Provenienz-, forstgenetische und forstzüchterische Arbeiten in Nordamerika. **[Work on provenance, forest genetics and breeding in N. America.]** *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/54*) No. 58, [1955?] (71–99). 19 refs. [G.]

A general review of research on selection (including provenance trials), hybridization and polyploidy, in the U.S.A. and Canada, with a list of points of special interest for Germany; based chiefly on a tour of study by the author.

1235. WAKELEY, P. C., and CAMPBELL, T. E. **Some new Pine pollination techniques.** *Occ. Pap. Sth. For. Exp. Sta.* No. 136, 1954. pp. 13. 2 refs.

Describes, with illustrations, certain simple equipment used at the A. J. Hodges Industries Experimental area near Many, La.

1236. MOLINA RODRIGUEZ, F. **On the genetic improvement of *Pinus pinaster* Sol.** *Transl. N.Z. For. Serv.* [n.d.] pp. 10. 20 refs. Transl. from *Montes, Madrid* 6, 1950 (499–520). [See *For. Abstr.* 12 (No. 1763).]

1237. AHLGREN, C. E. **Grafted selections of Eastern White Pine tested for resistance to blister rust.** *J. For.* 53 (10), 1955 (727–9). 4 refs.

Gives details of the growth of 1949 plantings on an island in Basswood Lake, Minnesota: 64 selections from 40 parents were compared with ungrafted controls. The grafts showed, after 6 years, a 5% infection with rust against 58% for the controls; also a high incidence of prostrate and angled forms and a greater mortality. Further study to eradicate these defects is required.

1238. ZAK, B. **Inheritance of resistance to littleleaf in Shortleaf Pine.** *Res. Note Stheast. For. Exp. Sta.* No. 88, 1955. pp. 2.

One-year-old progeny from 6 apparently resistant and 4 moderately diseased trees, all open-pollinated, were planted in a heavy clay soil inoculated with *Phytophthora cinnamomi*, which was flooded twice weekly during the growing season. A high % of the progeny of 5 of the former, and only a low % of the progeny of 3 of the latter showed signs of good resistance in their root systems.

1239. BARBER, J. C., DORMAN, K. W., and JORDAN, R. A. **Slash Pine crown width differences appear at early age in 1-parent progeny tests.** *Res. Note Stheast. For. Exp. Sta.* No. 86, 1955. pp. 2.

In randomized-block experiments with 20 to 100 trees per plot, the progeny of 5 narrow-crowned and 2 broad-crowned mother trees showed differences of crown width at 3 years, particularly at ⅓ height. These varied from 39 to 44% of total height for the narrow against 55% for the broad forms and 52–53% for unselected controls.

1240. MCWILLIAM, J. R., and FLORENCE, R. G. **The improvement in quality of Slash Pine plantations by means of selection and cross breeding.** *Aust. For.* 19 (1), 1955 (8–12).

Outplantings of *Pinus elliottii* progeny resulting from single tree selection and controlled crosses have been established in the Beerwah district of Queensland since 1942. A summary of the results of the initial progeny tests conducted on the oldest of these outplantings is given, and the method of assessment described. By restricting seed collection to a number of selected superior phenotypes, twice the number of 'acceptable stems' per acre were obtained, whereas progeny resulting from controlled crosses between individual selections yielded twice as many again. Recommendations are made for practical tree breeding on these lines. *From authors' summary.*

1241. BUSZEWICZ, G., EDWARDS, M. V., and MATTHEWS, J. D. **East Scotland Scots Pine seedling provenance trial.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (78–83). 1 ref.

Among the conclusions drawn from these trials are: (1) that mean height of seedlings is highly correlated with seed weight; (2) that seed weight is closely correlated with elevation above sea level of the parent stand; there is a similar correlation between % of under-developed embryos in the seed and elevation of parent stand.

1242. EICHE, V. **Spontaneous chlorophyll mutations in Scots Pine (*Pinus silvestris* L.).** *Medd. SkogsforsknInst., Stockh.* 45 (13), 1955. pp. 69. 31 refs. [E.e.sw.] Price *Kr.*4.

In these experiments seed from over 1000 trees in 43 stands in Norway and Sweden was sown in nurseries, in uniform conditions within the nursery, at Bogesund and Sundmo. Seedling mutants were classified into 4 mutation types (*albina*, *xantha*,

xanthoviridis and *viridis*), based on the colour of the cotyledons and the hypocotyl, and the plant mutants into 5 types (as above, plus *alboviridis*) based on the colour of the primary needles and needles. Analysis of the material showed 410 mutated trees at Bogesund, with a maximum mutant rate for a single tree of 83·06 per thousand, and 295 at Sundmo, the maximum mutant rate for an individual being 25%. Frequency polygons for the two nurseries follow similar patterns, corresponding to truncated logarithmico-normal distribution. In both nurseries, about 70% of the mutated trees gave only seedling mutants, 20% only plant mutants, and 10% both, while only 3% consistently produced both seedling mutants and plant mutants of the first and second year. Distribution of seedling and plant mutants combined into mutation types was, at Bogesund, *albina* 6%, *xantha* 30%, *xanthoviridis* 52% and *viridis* 12%, and at Sundmo 5, 13, 56 and 26% respectively. Figures for part C (the part containing the highest mutant rates) of the frequency polygon were 10, 48, 33 and 9% respectively at Bogesund and 10, 25, 57 and 8% at Sundmo. The % of mutated mother trees showing progeny of 1, 2, 3 and 4 mutation types respectively was at Bogesund 73·7, 21·2, 4·9 and 0·2 and at Sundmo 61·0, 33·9, 3·4, and 1·7%. Rates of chlorophyll mutation types in relation to those obtained for barley are discussed. In greenhouse experiments with several mother trees whose progeny had already been studied in the field, both mutant rates and rates of germination were higher than in the field. Differences between greenhouse and field mutant rates were statistically significant in 1954, when tests were on trees with low mutant rates, but the evidence was less clear in 1953 in tests on trees with high rates. Dwarf chlorophyll mutants (particularly *albina* and *xantha*) were comparatively common in the greenhouse. Distribution of mutant types in the greenhouse was *albina* 13, *xantha* 8, *xanthoviridis* 21 and *viridis* 58%. Observations in the nursery at Bogesund showed that of 1368 mutants 83% died within 2 years, 3% turned green and were indistinguishable from normal individuals, and 14% survived, preserving their chlorophyll deficiency; these represent 0·02% of the total number of plants in the experiment. In the field trials, all types of seedling mutants were lethal, and in the greenhouse all except *viridis* which was semi-lethal. First- and second-year mutants of *albina* and *xantha* type were lethal in the first-year plants, the others were semi-lethal, while in second-year plants mortality in the other two types was no higher than in normal plants. As the result of a study of chlorophyll mutations in stands, histograms and graphs are given showing the distribution of chi-square values in different stands, obtained from mutant rates in the progeny of individual heterozygous trees, the distribution of relative frequencies of stands on the basis of % of mutated trees in stands and the relation between mutant rates in stands and the % of mutated mother trees. Most of the stands with a high % of mutated trees are in districts with favourable climates, associated with better germinating capacity of the seeds. Mutant rates in stands increase slowly with increase in % of mutated trees. The distribution of stands is 0, 38, 33, and 29%. Mutation types occur as follows: *xanthoviridis* in all stands, *viridis* in 86%, *xantha* in 70% and *albina* in 36% of all stands. A study of frequencies of mutation type in 84 stands in 3 regions of Norway and Sweden shows that relative frequency of *xanthoviridis* is the same for all regions, *albina* values are low in northern and mountainous (region 1) and in the central region (region 2) and *xantha* values are high in region 3 (the southern part) and low in region 1, while the reverse is true for *viridis* values.

1243. LANGNER, W. Dominante Vererbung von Wüchsigkeit und Wuchsform bei Fichte (*Picea abies*). **[Dominant inheritance of thriftiness and growth form in *P. abies*.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (138). [G.]

Comparisons of freely pollinated Spruce from the Flensburg Forest District, the Tannenhöft Arboretum, and various native provenances, showed marked differences in the 1- and 2-year-old plants. The Flensburg plants were by comparison less thrifty, with needles of a greyish-green. Crosses between the Flensburg (♀) and the Tannenhöft (♂) trees produced hybrids almost entirely resembling the Tannenhöft trees.

1244. LANGNER, W. Blütenbildung an Zwergfichten. **[Flowering in dwarf Spruces.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (138). [G.]

Reports flowering of 40-year-old dwarf Spruces in the Tannenhöft Arboretum. One form (*Picea abies* var. *compacta pyramidalis*) had both ♂ and ♀ flowers; another form (*P. abies* var. *pygmaea*) had only ♂ flowers. Crosses were made among the flowering dwarf forms and with normal *P. abies*.

1245. LANGNER, W. Rückmutation bei Zwergfichte. **[Back-mutation in dwarf Spruce.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (138–9). [G.]

Cites an example of a 40-year-old *Picea abies* var. *humilis* in the Tannenhöft Arboretum, which has begun to put out more or less normal shoots. There is no question here of grafting dwarf strains on to normal stock. A process of back-mutation would seem to be involved.

1246. EIFLER, I. Künstliche Polyploidie-Erzeugung bei *Picea abies* und *Betula verrucosa*. **[Induced polyploidy in *P. abies* and *B. verrucosa*.]** *Z. Forstgenet.* 4 (6), 1955 (162–6). 16 refs. [G.g.e.f.]

Tetraploid plants of *P. abies* were raised from colchicine-treated seed. They were characterized by very poor growth and sharp, short needles, dark-green in colour. From colchicine-treated seed of *B. verrucosa* 6 tetraploid and 1 mixoploid were obtained. The tetraploid plants had strong, deeply serrated and wavy leaves, with a typical heart-shaped indentation at the base of the leaf. The results are presented of measurements of stomata on both the Spruce and the Birch. *From author's summary.*

1247. ILLIES, Z. M. Weitere Erfahrungen mit colchicinierten Lärchen. **[Further experiments with colchicine-treated Larch.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (136–7). [G.]

Shoot tips alone of germinated Larch seed were treated with warm 0·5% colchicine solution in order to avoid damage to roots and subsequent mortality. As a result 2·8% of plants survived as against 0·09% in previous experiments in which the whole germinated seed was treated [cf. *For. Abstr.* 13 (No. 2780)]. Experiments in cutting back the aerial parts of 4-year-old Larch and treating with colchicine proved unsuccessful.

1248. SCHAD, C., SOLIGNAT, G., GRENTE, J., and TREIL, J. Résultats obtenus en France dans l'amélioration du châtaignier. **[Results obtained in France in Chestnut breeding.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH*/15-*C*, 1955. pp. 21. [F.] Limited distribution.

Describes the breeding programme and methods, and the results obtained in the way of disease-, frost-, and drought-resistance.

1249. BERRY, F. H. **Present status of Chestnut breeding work in the United States Department of Agriculture.** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH*/15-*A*, 1955. pp. 3. Limited distribution.

1250. ELORRIETA, J. Un type intéressant de châtaignier: *C. crenata* × *C. koraiensis*. **[An interesting hybrid Chestnut: *Castanea crenata* × *C. koraiensis*.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH*/15-*E*, 1955. pp. 2. Limited distribution.

Describes a single individual (now 5 years old) raised at Madrid. It is 4·10 m. high, 17 cm. g.b.h. and began to bear fruit at 4 years; it is hoped that it will inherit both parents' disease-resistance.

1251. KRAHL-URBAN, J. Einige neue Ergebnisse von Rassenstudien bei der Rotbuche. **[New studies of races in *Fagus sylvatica*.]** *Z. Forstgenet.* 3 (6), 1954 (137–8). [G.]

Presents the results of studies in Beech stands of the Bavarian-Bohemian forest, the eastern Bavarian Alps and the Karawanken Mts. It is suggested that two races of Beech ('eastern' and 'western') can be distinguished. 'Eastern' Beech is found in the Karawanken Mts; 'western' Beech in the Badensee region, the Black Forest and the northern Alps. The race found in the Bavarian-Bohemian forest is doubtful, but is probably 'eastern' Beech. One of the most important selective factors at high altitudes is undoubtedly snow. The universal coppicing ability found in the Karawanken Mts. is probably a characteristic of 'eastern' Beech.

1252. BARNER, J. Eine Selektionsmöglichkeit verschieden lichtreagibler Pappelklone. **[The possibility of selecting Poplar clones with different phototropic reactions.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (135). [G.]

Variable phototropic reactions among different Poplar clones growing in the open suggested the possibility of selecting clones less sensitive to shade than others. This possibility was proved by laboratory experiments. Such selected clones would be suitable for planting in gaps where a tree is required to grow quickly and close the canopy, without its form being unduly distorted by shading.

1253. SEITZ, F. W. Über den Selbstungs- und Kreuzungserfolg bei Verwendung des Pollens der zwittrigen Graupappel von Dillingen. **[Results of selfing and crossing using pollen of the Dillingen androgynous Grey Poplar.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (141). [G.]

In addition to selfing experiments, crosses were made using pollen of the androgynous form with a large number of ♀ *Populus tremula*, *P. alba* and *P. canescens*. In all, ca. 76,000 seedlings were obtained. Cytological tests showed that all plants resulting from selfing or crossing were triploids. [Cf. *For. Abstr.* 15 (No. 3267).]

1254. FLORDH, S. Studier av några F_2-populationer av hybridasp. **[Studies on some F_2 populations of hybrid Aspen.]** *Svenska SkogsvFören. Tidskr.* 52 (3), 1954 (287–98). 6 refs. [Sw.]

(*a*) F_2 crosses (progeny from 3 crosses) of *Populus tremuloides* × *P. tremula*, (*b*) F_1 crosses, and (*c*) pure *P. tremula*, were measured in 1949, 1952 and 1953 (their 5th growing season). Statistical analysis of the results showed that (*b*) were significantly taller in 1952 and 1953, and (*c*) in 1953, than (*a*). Height variation was much greater among (*a*) plants; the tallest were inferior to the tallest of (*b*), while only 7% of the progeny from the best of (*a*) exceeded (*b*), and 20% (*c*), in mean height. A qualitative ocular determination was made of stem form and branch type of the different plants: (*a*) were greatly inferior to (*b*) in both characteristics; the average quality of (*c*) was above that of (*b*). Examination of plants after an attack by rust fungus showed that (*a*) was similar in resistance to (*c*) and very much inferior to (*b*); similar relationships were found for attack by leaf-eating insects. In autumn (*a*) lost their leaves later than (*c*) but earlier than (*b*); in individual leaf area (*b*) were significantly larger than (*a*) while (*c*) was intermediate. Conclusions drawn are that the F_2 generation should not be used in forestry; regeneration from coppice shoots of the F_1 and eventual replanting with F_1 is preferable.

1255. SCHÖNBACH, H. Celluloseuntersuchungen an Einzelstämmen und Klonen der Pappel. **[Cellulose contents of Poplar clones and individual stems.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (139–40). [G.]

Samples taken with an increment borer from living trees were tested for cellulose content. Variations were found from tree to tree within the same stand and in different parts of the bole. In 2 felled trees of *Populus tremula* and × *P. euramericana* marked variations were revealed in the upper part of the bole, so that samples taken at one place (e.g. at b.h.) would be worthless in assessing the whole stem. Investigations were also made on the 1- to 4-year-old wood of clones of different *euramericana* forms, of *P. trichocarpa* and of *P. berolinensis*. An increase in cellulose content with age was confirmed, the increase varying in different strains, though clones were found that in all 4 years showed more than average values. Marked variations in cellulose content were found in clones hitherto

considered to be genetically uniform. Tests on 2-year-old plants resulting from crosses within the section *Leuce* showed cellulose contents equal to material from the Graupaer clones of the same age. The author suggests that there exist specific and racial characteristics in respect of cellulose content which could be used in breeding.

1256. **[Genetics of Wattles.]** *Rep. Wattle Res. Inst. S. Afr. 1954/55*, 1955 (17–20). 2 refs.

Additional information is given on the genetics of (*a*) *Acacia decurrens*, and (*b*) *A. decurrens* var. *mollissima*, and of crosses (*a* × *b*) and back-crosses to (*b*). Details cover 8 measurements of leaf characters, time of flowering, and seed maturation period. In progeny tests of parent trees of (*b*), highly significant differences were found between families for gummosis, an important disease generally considered to be of physiological origin. An apparent correlation with vigour did not prove significant. The incidence of black butt, mainly caused by *Amauroderma rugosum* and *Schizophyllum commune* showed highly significant differences among the progeny. In a comparison of self- and open-pollinated progeny of 17 selected trees of (*a*), 3 families, in contrast with the rest, did not suffer a marked decrease in vigour from selfing either in height, diameter or bark yield. The data are tabulated in detail.

1257. TANAKA, N., TAKEMASA, N., and SINOTO, Y. **Karyotype analysis in Gymnospermae I. Karyotype and chromosome bridge in the young leaf meristem of *Ginkgo biloba* L.** *Cytologia, Tokyo* 17 (2), 1952 (112–23). 35 refs. [E.e.] C.G.B.

1258. SYMON, D. E. **A hybrid swarm in *Cassia*.** *Aust. J. Bot.* 3 (2), 1955 (190–6 + 1 plate). 1 ref. O.B.D.

Specimens collected from a hillside near Alice Springs, central Australia, showed intermediate characters suggestive of a hybrid swarm between *Cassia desolata* var. *involucrata* and *C. artemisioides*. A statistically significant increase in the number of leaflets per leaf of *C. artemisioides* on progressing from the lower to the higher levels of the hillside formed a good example of a cline.

1259. CLIFFORD, H. T. **An index for use in quantitative taxonomic problems.** *New Phytol.* 54 (2), 1955 (132–7). 5 refs. [University of Durham.] O.R.S.

Describes a geometrical method of obtaining a simple index value for each plant of 2 varieties or species, based on measurement of 2 characters plotted against each other. Gives an example of the use of the method on a presumed hybrid swarm between *Eucalyptus elaeophora* and *E. goniocalyx*, using the characters fruit length and fruit weight. The values obtained, plotted as a frequency polygon, demonstrate much more clearly the intermediate character of the members of the swarm than either character plotted separately. [Cf. *For. Abstr.* 16 (No. 2687).]

168. Histology

See also Nos. 1207, 1224–6, 1299, 1783, 1924 *et seq.*

1260. JACQUIOT, C. Sur le rôle des corrélations d'inhibition dans les phénomènes d'organogénèse observés chez le tissu cambial, cultivé *in vitro* de certains arbres. Incidences sur les problèmes du bouturage. **[The role of reciprocal inhibiting influences in the phenomena of organogenesis observed in cambial tissue of certain trees, grown *in vitro*; its relation to the problem of propagation by cuttings.]** *C.R. Acad. Sci., Paris* 241 (16), 1955 (1064–6). 4 refs. [F.f.] O.R.S.

Discusses results of experimental cultures of cambial tissues of *Ulmus campestris* (which formed buds immediately and roots after the first transplanting), *Betula verrucosa* and *Tilia parvifolia* (which formed roots only after 2 transplantings) and a number of other species which failed to form roots after transplanting. Concludes that (1) with *U. campestris*, factors inhibiting bud formation disappear as soon as the tissue is removed from the tree, but bud-forming substances present in the original tissues cannot be synthesized by them after transplanting; (2) factors inhibiting root growth of *U. campestris*, *B. verrucosa* and *T. parvifolia*, present in the tissue removed from the tree, are diluted after several transplantings, whereas factors favouring root growth remain constant. The importance of these opposing factors favouring and inhibiting root formation in propagation by cuttings is stressed.

17. Systematic Botany

See also No. 1259.

172.8. Eumycetes (True Fungi)

See also Nos. 1160–2, 1725 *et seq.*, 2137 *et seq.*

1261. ETHERIDGE, D. E. **Comparative studies of North American and European cultures of the root rot fungus, *Fomes annosus* (Fr.) Cooke.** *Canad. J. Bot.* 33 (5), 1955 (416–28 + 1 plate). 25 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 176.) O.R.S.

Cultures of *F. annosus* originating in Europe could not be distinguished from those originating in N. America, by colony appearance, growth rate, pH optimum or cellulolytic activity.

174. Spermatophyta, Seed-Plants in General. Floras and Check-Lists

1262. AMELINCKX, F., and AMELINCKX, S. **Lexicon dendrologicum.** De Sikkel, Antwerp. 1955. pp. xvi + 508. 26 refs. [Du.E.F.G.] Price *Fl.*21·5 [£2].

Rehder's 'Manual of cultivated trees and shrubs' has been used as the basis for the scientific names in this work, which is arranged in alphabetical order of genera. Under each species it gives Dutch, English, French and German names. There are indexes of synonyms as well as of the 4 languages. All the foregoing are in two parts—one for conifers and one for broadleaved species. There are also a list of plant families, an alphabetical list of Latin botanical terms with equivalents in the 4 languages,

an index of abbreviated authors' names, and a short bibliography.

1263. LÉONARD, J. Les conceptions génériques et spécifiques en Afrique tropicale et leur incidence sur l'établissement des aires. **[Concepts of genera and species in tropical Africa and their bearing on the delimitation of natural ranges.]** Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (387–403). [F.e.it.]

Discusses the advantages of splitting up large, heterogeneous genera, emphasizing the need for correlation of primary (flower and fruit) and secondary (vegetative etc.) characters in defining genera. As regards species, those in the dense forests are remarkably fixed in contrast with the great plasticity of those of the savanna and dry forest (miombo), where it appears necessary to take a broad view of what constitutes a species. Numerous examples and suggestions for rules in classification are given.

1264. MENDONÇA, F. A. [Editor.] Contribuições para o conhecimento da flora de Moçambique—II. **[Contribution to the flora of Mozambique—II.]** *Estud. Ensaios e Docum. Junta Invest. Ultramar, Lisboa* No. 12, 1954. pp. 188. [Port.]

Cf. *For. Abstr.* 13 (No. 1885).

1265. SANTOS BILONI, J., and GROSSO, R. Reseña de las especies leñosas mas características o importantes del bosque chaqueño occidental. **[Descriptions of the most characteristic and important woody species of the western part of El Chaco.]** *Publicación, Ministerio de Industria de la Nación, Combustibles Vegetales y Derivados (E.N.D.E.), Buenos Aires* No. 9. 1954. pp. 30 + x + 15 plates. 67 refs. [Span.]

Short illustrated descriptions of 49 species with notes on their properties and uses.

174.2/.7. Gymnosperms

See also Nos. 1228, 1299.

1266. ØSTERGAARD, J. *Ginkgo biloba* L., tempeltræ: et bidrag til vor viden om artens forekomst og trivsel i Danmark. **[*G. biloba*: its occurrence and growth in Denmark.]** *Naturens Verden, København* 38 (5/6), 1954 (156–69). 44 refs. [Dan.e.] L.S.

A list of 48 trees occurring in Denmark, giving particulars of age, dimensions, and flowering and fruiting, with some botanical details and a discussion of nomenclature, hardiness in Denmark, and the use of the tree and its wood.

1267. FRANCO, J. DO AMARAL. Nomenclatura de algumas coníferas. **[Nomenclature of some conifers.]** *An. Inst. Agron., Lisboa* 19, 1952/53 (5–23). [Port.e.]

Discusses the validity of names and synonyms of some species of *Araucaria, Callitris, Glyptostrobus, Larix, Pseudolarix, Podocarpus* and *Taxus*.

1268. TURRILL, W. B. ***Abies pinsapo* var. vel hybrida.** *Curtis's Botanical Magazine, London (n.s.)* 170 (Part 3, Tab. 242), 1955 ([1–5] + 1 plate). 38 refs. L.S.

Describes a tree (history unknown) grown at Kells, Co. Meath, exhibiting characters of both *A. pinsapo* and *A. numidica*, and discusses the relationship (and possible identity) of the two species.

1269. LAING, E. V. **Morphological variations in tree species.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (56–7). [Department of Forestry, Aberdeen University.]

The cotyledons of Japanese and European Larch differ in the following characters: thickness of the cuticle, texture of the epidermis, number of cells in cross-section of the endodermis, presence of sclerenchyma cells in the bundle, number of armed mesophyll cells.

1270. GAUSSEN, H. Classification des pins diplostélés. **[Classification of the *Diploxylon* Pines.]** *C.R. Acad. Sci., Paris* 241 (20), 1955 (1366–9). [F.] O.R.S.

Presents a new table [cf. *For. Abstr.* 14 (No. 89)] showing grouping of Pine species according to their hybridizing properties, based on cotyledon type and wood structure.

1271. WOODS, F. W., and DAWSEY, C. D. **A pseudomonofolious Sand Pine.** *Bot. Gaz.* 116 (3), 1955 (292). O.B.D.

Describes a specimen found in association with normal trees in Florida. The needles, normally in fascicles of 2, appeared to be single and terete, but in fact each 'needle' consisted of 2 separate ones cohering tightly by their adaxial surfaces. Steps have been taken to air-layer this specimen.

1272. FUKAREK, P. Nekoliko napomena u vezi sa našom endemnom munikom (*Pinus heldreichii* Christ). **[Some observations in connexion with *P. heldreichii*, native of Jugoslavia.]** *Šumarstvo* 8 (7/8), 1955 (484–7). [Croat.]

Describes 3 varieties of this species (*typica, leucodermis*, and *pančići*), its distribution and economic value.

175.2. Monocotyledons

See also No. 1596.

1273. RAIZADA, M. B. **Grasses of the Upper Gangetic Plain and some aspects of their ecology.** *Indian For. Rec. (n.s.)* 4 (5), 1954 (83–103). 32 refs. (*Repr.* from *Indian For.* 80 (1), 1954 (24–46).)

176.1. Dicotyledons

See also Nos. 1229–31, 1258–9, 1318, 1934.

1274. ZOHARY, M. **A monographical study of the genus *Pistacia*.** *Palest. J. Bot. (J. Ser.)* 5 (4), 1952 (187–228). 23 refs.

1275. PICHON, M. Classification des Apocynacées. 1. Carissées et Ambelaniées. **[Classification of the Apocynaceae. I. Carisseae and Ambelaneae.]** *Mémoires du Muséum National d'Histoire Naturelle, Paris (n.s.)* 24 (3), 1948 (112–82). 31 refs. [F.]

1276. PICHON, M. Classification des Apocynacées. IX. Rauvolfiées, Alstoniées, Allamandées, et

Tabernémontanoidées. **[Classification of the Apocynaceae. IX. Rauwolfieae, Alstonieae, Allamandeae and Tabernaemontanoideae.]** *Mémoires du Muséum National d'Histoire Naturelle, Paris (n.s.)* 27 (6), 1948 (153–251 + 11 plates). 33 refs. [F.]

1277. PICHON, M. Classification des Apocynacées. XXV. Échitoïdées et supplément aux Plumeröidées. **[Classification of the Apocynaceae. XXV. Echitoideae and supplement to the Plumeroideae.]** *Mémoires du Muséum National d'Histoire Naturelle, Paris (n.s.) Sér. B. Botanique* 1 (1), 1950 (1–170 + 11 plates). 39 refs. [F.]

1278. SCHULTES, R. E. **A note on the genus *Joannesia*.** *Botanical Museum Leaflet, Harvard University, Cambridge, Mass.* 17 (1), 1955 (25–6).

Decides that *J. insolita*, known only from a single tree in a yard of an abandoned house near Caracas, represents a specimen of *J. princeps* introduced from Brazil, and that it should be reduced to synonymy with the latter.

1279. SCHULTES, R. E. **A new generic concept in the Euphorbiaceae.** *Botanical Museum Leaflet, Harvard University, Cambridge, Mass.* 17 (1), 1955 (27–36 + 1 photo + 1 drawing + 1 map).

Botanical description, distribution and discussion of taxonomic position of *Vaupesia cataractarum* gen. et sp. nov., which is closely allied to the *Hevea/Micrandra/Joannesia* complex. It occurs in *caatinga* forests on hilly and sloping areas alongside or very near rapids in Colombia.

1280. MARTÍNEZ, M. Los encinos de México. V. **[The Oaks of Mexico. V.]** *An. Inst. Biol. Univ. Méx.* 26 (1), 1955 (29–58). [Span.] C.G.B.

Describes 20 species of the subgenus *Lepidobalanus*. [Cf. *For. Abstr.* 16 (No. 2713).]

1281. LEROY, J. F. Étude sur les Juglandaceae. À la recherche d'une conception morphologique de la fleur femelle et du fruit. **[Study of the Juglandaceae. Attempt to find a concept of the morphology of the female flower and the fruit.]** *Mémoire du Muséum National d'Histoire Naturelle, Paris (n.s.) 6 B*, 1955. pp. 246 + 31 plates. Many refs. [F.f.] O.B.D.

As a result of the study the following proposals are made: (1) The family should be divided into two sub-families: Juglandoideae (*Juglans, Carya, Annamocarya*), and *Oreomunnoideae* (*Alfaroa, Oreomunnia, Engelhardtia, Pterocarya* and *Platycarpa*). (2) The status of two notable Juglandoideae is established on a new basis, and the following names are proposed for them: *Annamocarya sinensis* (*A. indochinensis*); *Carya poilanei* (*Juglans poilanei*). (3) *Annamocarya* is phylogenetically close to *Carya* but is retained as a separate genus. A revision is also presented of a large number of fossil Juglandoideae. Observations on the morphology of the ♀ flowers and fruit of the 8 genera of the Juglandaceae are given in some detail. Placentation on the whole is remarkably homogeneous and appears under three perfectly distinct aspects corresponding to the genera *Juglans, Annamocarya* and *Oreomunnea*. Vascular anatomy was used for the first time as a criterion for distinguishing the species. Some new concepts are put forward with respect to the ♀ flower in general and that of the Juglandaceae in particular. *From author's summary.*

1282. BISHOP, G. N., and NELSON, T. C. **A winter key to the Hickories of Georgia.** *Res. Note Stheast. For. Exp. Sta.* No. 89, 1955. pp. 2. 1 ref.

1283. KOSTERMANS, A. J. G. H. Notas sôbre as Lauraceae-Lauroideae sul-americanas. **[The South American Lauraceae-Lauroideae.]** *Bol. téc. Inst. agron. Norte* No. 28, 1953 (49–75). [Port.e.f.]

A key to the genera and a list of species and synonyms, giving new localities.

1284. BERHAUT, R. P. Le 'Gonakié' et le 'Nèbnèb' au Sénégal. **['Gonakié' and 'Nèbnèb' in Senegal.]** *Bull. Soc. bot. France* 102 (5/6), 1955 (213–5). 18 refs. [F.] O.B.D.

Discusses the identity of these two trees and concludes that there exist two species with one variety, viz. *Acacia adstringens* (Nèbnèb), *A. nilotica* and *A. nilotica* var. *pubescens* (Gonakié).

1285. KEAY, R. W. J. **A new species of *Parkia* R. Br. (Leguminosae-Mimosaceae) [*P. clappertoniana*.]** *Bull. Jard. bot. Brux.* 25 (3), 1955 (209–12). [E.] O.B.D.

1286. HOYLE, A. C. **Notulae systematicae. II. A new species of *Brachystegia* [*B. kennedyi*.] from southern Nigeria (Caesalpiniaceae).** *Bull. Jard. bot. Brux.* 25 (2), 1955 (183–90). [E.] O.B.D.

1287. AMSHOFF, G. J. H. O gênero *Crudia* na América do Sul. **[The genus *Crudia* in South America.]** *Bol. téc. Inst. agron. Norte* No. 28, 1953 (77–83). [Port.e.f.]

A key to the species, descriptions and range.

1288. BALLE, S. À propos de la morphologie des '*Loranthus*' d'Afrique. **[The morphology of African '*Loranthus*'.]** Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (541–85 + 1 plate + 1 tbl. + 1 dgm. + 2 maps). 14 refs. [F.e.it.]

Loranthus, a name of suspected legitimacy, still covers for most authors the 300 African species described. Supported by detailed classification in diagrams, drawings and tables and by a discussion of evolutionary trends (Australasian, American and African) a key is given for a proposed grouping of the African species into 22 genera, 4 of which are Danser's Australasian congeners, and 18 of which are for the most part van Tieghem's genera coinciding with Sprague's sections except for the fusion of a few of the less well defined of the latter.

1289. **Eucalypts for planting.** *FAO For. & For. Prod. Stud.* No. 11, 1955. pp. 403. 13 pp. of refs. [E.] Price $3·50 (17*s.* 6*d.*).

A translation from the original French version already noticed [see *For. Abstr.* 16 (No. 1475)]. The English version appears to be differently arranged but not otherwise changed.

1290. GERMAIN, R. Acquisitions nouvelles pour la flore du Congo Belge (Octoknemaceae,

Flacourtiaceae, Guttiferae). [**Species new to the flora of the Belgian Congo (Octoknemaceae, Flacourtiaceae, Guttiferae).**] *Bull. Jard. bot. Brux.* 25 (3), 1955 (261–4). [F.] O.B.D.

Includes descriptions of the new tree species *Octoknema hulstaertiana* and *Endodesmia calophylloides*.

1291. PIRES, J. MURÇA. Plantas novas da Amazonia. [**New plants of Amazonia.**] *Bol. téc. Inst. agron. Norte* No. 28, 1953 (45–7 + 2 plates). [Port.]

Contains descriptions of the new species *Lacunaria oppositifolia* and *L. umbonata*, both small trees.

1292. GRAPENGIESSER, S. Anteckningar till de skandinaviska *Salix*-arternas systematik och nomenklatur. [**Systematics and nomenclature of the Scandinavian *Salix* species.**] *Bot. Notiser* 108 (3), 1955 (321–40). 3 pp. of refs. [Sw.] O.B.D.

Discusses species arrangement, grouping within the genus, species names and synonyms, and binomial names for hybrids.

1293. PELLEGRIN, F. Sapindacées nouvelles du Gabon: *Chytranthus*, Hook. f., *Pancovia* Wild., *Pseudopancovia* Pellegr. et *Placodiscus* Radlk. [**New Sapindaceae from Gabon: *Chytranthus, Pancovia, Pseudopancovia* and *Placodiscus*.**] *Bull. Soc. bot. France* 102 (5/6), 1955 (226–9). [F.] O.B.D.

Describes 3 new species of *Chytranthus*, the new species *Pancovia le testui* and *Placodiscus le testui* and a new genus *Pseudopancovia* with a single species *P. heteropetala*.

1294. DUCKE, A. As espécies brasileiras do gênero *Pradosia* Liais (Fam. Sapotaceae). [**The Brazilian species of *Pradosia*.**] *Bol. téc. Inst. agron. Norte* No. 28, 1953 (21–34). 9 refs. [Port.e.f.]

Eleven Brazilian species are described, including a new one, *P. verrucosa*. *Pradosia* is retained as a valid genus although other botanists include it in *Chrysophyllum* or *Pouteria*. In the Amazon region all species of Sapotaceae having a sweet bark are known by the common name of 'pau doce'.

1295. SCHULTES, R. E. **A new narcotic genus from the Amazon slope of the Colomban Andes.** *Botanical Museum Leaflet, Harvard University, Cambridge, Mass.* 17 (1), 1955 (1–11 + 2 photos + 2 drawings).

An account of the discovery, together with botanical description and medicinal use by Indian tribes, of the tree that has been named *Methysticodendron amesianum*. [Cf. *For. Abstr.* 16 (p. 595).]

1296. DUCKE, A. As espécies brasileiras do gênero *Theobroma* L. [**The Brazilian species of *Theobroma*.**] *Bol. téc. Inst. agron. Norte* No. 28, 1953 (3–20). 15 refs. [Port.e.f.]

1297. MOLDENKE, H. N. **Materials toward a monograph of the genus *Vitex*. IV.** *Phytologia* 5 (7), 1955 (293–336). A.P.B.

Cf. *For. Abstr.* 16 (No. 2720).

1298. STAFLEU, F. A. ***Vochysia lanceolata* sp. nov.** *Trop. Woods* No. 102, 1955 (49 + 1 plate). [International Bureau of Plant Taxonomy and Nomenclature, Utrecht.]

18. Plant Ecology

1299. Festschrift für Erwin Aichinger zum 60. Geburtstag. [**Papers presented to E. Aichinger on the occasion of his 60th birthday.**] *Angew. PflSoziol., Wien* Spec. issue, 1954. 2 vols. pp. xxii + 1311.

Includes, among other papers, a bibliography of Aichinger's works and the following contributions of forestry interest [in German, English or Italian; the titles here given being renderings rather than literal translations]: Conspectus of native and cultivated conifers in Austria (*E. Janchen*, pp. 1–42); The bearing of present distribution on the evolutionary history of *Pinus* spp., especially those of the Mediterranean region, and particularly *P. sylvestris* (*R. Scharfetter*, pp. 43–9); Historical notes on the distribution of *P. sylvestris* in Austria (*L. Tschermak*, pp. 50–70); The disappearance of woody species from the Alps during the glacial period (*H. Gams*, pp. 71–6); The longevity of *Salix* pollen (*Y. Sato* and *K. Muto*, pp. 77–82); Seasonal course of growth in *Betula verrucosa* as related to latitude of provenance (*W. Wettstein*, pp. 83–7); Developmental phases in woody plants, with special reference to vegetative propagation (*F. Passecker*, pp. 89–102); Relations between size of organs and cell size in plants dwarfed by site conditions—studies in foliage and wood anatomy in normal and dwarfed *Picea glehnii* and *P. abies* (*J. Kisser* and *A. Steininger*, pp. 103–14); Girdling trees to create additional pastures, with special reference to *Alnus incana* in the Hohe Tauern (*F. Widder*, pp. 115–22); The sole station of *Betula nana* in Tyrol, and The highest station of *Pinus cembra* in the E. Alps (*H. von Handel-Mazzetti*, pp. 123–4); The vegetation of Romagna, N. central Italy (*P. Zangheri*, pp. 354–94); Comparative studies of the natural forest vegetation of Austria and Switzerland (*M. Onno*, pp. 406–22); The dry forests and thermophilous forest communities of S. Germany (*A. Rühl*, pp. 423–36); The deciduous-forest communities of the Harz region (*H. Meusel*, pp. 437–72); The Baltic mixed Beech woods (*A. Scamoni*, pp. 473–85); Outline of the forests of Afghanistan (*H. F. Neubauer*, pp. 494–503); Outline of Formosan vegetation and its floristic characteristics (*T. Hosogawa*, pp. 504–11); The Andean Alder forest (*Alnus jorullensis* association, Tucumán province, Argentina) (*K. Hueck*, pp. 512–72); Steppes, dry grassland and forests of the Pannonian region, central Europe (*G. Wendelberger*, pp. 573–634); The concept of forest history (*F. von Hornstein*, pp. 685–707); The transpiration of trees used for planting on deforested areas in Venezuela (*V. Vareschi*, pp. 721–9); Deciduous forests on 'two-layered' soils (e.g. sand over clay), with special reference to discrepancies between woody and herbaceous vegetation due to differences of rooting depth (*W. Zimmermann* and *R. Beck*, pp. 746–53); Growth dynamics in the *Carex alba* type of Beech forest in the Berchtesgaden limestone Alps, with special reference to the development of vegetation and soil, and the growth of Beech, Larch, Scots Pine, Sycamore Maple, Silver Fir and Norway Spruce

(*H. Mayer*, pp. 764–84); Altitudinal forest zones in Styria (*O. Eckmüllner* and *G. Schwarz*, pp. 802–23); The ecology of the timberline on the Feldberg, Schwarzwald (including data on the osmotic value of bud and shoot tissues in some representative species) (*W. R. Müller-Stoll*, pp. 824–47). Beech at the S. limits of its range (*A. Hofmann*, pp. 855–70); Theoretical and practical value of plant sociology for forestry (*M. Wraber*, pp. 871–80); Forest types of the N. slopes of the Totes Gebirge and their successional status (*H. Hufnagl*, pp. 881–900); Forest communities of the central German mountains on sites of optimum and extreme moisture, compared with Alpine types (*K. Hartmann*, pp. 901–15); Methods used for forest type studies in Czechoslovakia (*A. Zlatník*, pp. 916–55); The basis of 'forest types' (*W. Sukatschew* [*V. Sukačev*], pp. 956–64); A forest type diagram for the Scandinavian Beech forests (*B. Lindquist*, pp. 965–70); Status of New Zealand forest vegetation (*V. J. Chapman*, pp. 971–7); Silver Fir forest and its lessons for practice (*K. Dannecker*, pp. 978–94); 'Quasi-natural' methods in forest growth studies and the theory of management, with special reference to site factors (*V. Dieterich*, pp. 1000–13); Problems of forest hygiene (*E. Schimitschek*, pp. 1014–28); Some physiological effects of atmospheric pollution on plants (*O. Härtel*, pp. 1029–1034); The problem of 'crisis-resistance' in forestry, with special reference to the stability of the forest in relation to natural catastrophes and man's aims in the production forest (*A. von Vietinghoff-Riesch*, pp. 1035–55).

Almost all of these papers have bibliographies.

181. Mode of Life, Autecology. Silvicultural Characters of Trees

See also Nos. 1289, 1408, 1414, 1444–6.

1300. Gindel, I. **Ecological behaviour, growth, and yield of the Aleppo Pine (*Pinus halepensis*) Mill. in Israel.** *Emp. For. Rev.* 34 (4), 1955 (369–83 + 4 photos).

Among the 200 species of Pines growing naturally in the northern hemisphere, the Aleppo is distinguished by the fact that it is xerophytic: it grows well, not only on limestone formation in its habitat, but also in semi-arid or desert regions. Properly selected, planted, and thinned, the Aleppo Pine shows a high survival rate and good development without irrigation in regions with as little as 14 in. annual rainfall, provided distribution is fairly even. Minimum irrigation for 2–3 years after planting will ensure success on the edge of desert areas. This tree is highly adaptable to various types of soils, especially porous soils, and changes its root system and shape to fit the environment; it succeeds under ecological conditions too poor for most other Pines. Proper spacing is essential to optimum development. Density should conform to the ecological conditions, ranging from about 2 × 2 m. in the natural habitat to 3 × 3 m. or even 5 × 5 m. in areas where annual rainfall is < 8 in. Thinning practices are of the utmost importance. Only suppressed or partially suppressed trees should be removed in the first thinnings between the ages of 10 to 30 years. Sub- and co-dominants should be removed after 20–30 years in order to encourage girth increment. Too-wide spacing, or excessive thinning, result in over-branching before the forest canopy is complete, and in the twisted trunks so often found in the solitary Aleppo. Experiments during the past 20 years have shown that where proper treatment and density are maintained, the mean height-curve of the Aleppo Pine is stable and is characteristic of this tree. Mean height-curves obtained from measurements of sample plots in 60 forests were of the same shape in all cases where normal conditions prevailed. This curve is diagnostic not only of biometrical development, but of the physiological, light-demanding character of the species, and of site quality. The more accurate mean-height curves obtained by the methods outlined in this paper may also be diagnostic for other species, although the shape of the curve will vary with different species. Once the normal curve is established for a species, it may serve as a prognosis of the forest's value: a normal curve during the early years is a sure indication that there will be a maximum number of trees in the higher girth classes. *From author's summary.*

1301. Querengässer, F. Die grüne Douglasie (*Pseudotsuga taxifolia*, Douglas Fir, Red Fir) und ihre Begleitholzarten. [**'Green' Douglas Fir and species associated with it.**] *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/1954*) No. 58, [1955?] (127–41). [G.]

Notes chiefly on silvicultural characters, diseases and pests, natural regeneration, the problem of provenance, and associated species, in the natural range of the species.

1302. Galoux, A. Le Tsuga de Californie. (***Tsuga heterophylla* (Raf.) Sarg.**) *Bull. Soc. for. Belg.* 62 (11), 1955 (458–95 + 6 photos). 10 refs. [F.]

An account of the silvicultural characters, silviculture, protection, growth and yield of this species, both in its natural state and as introduced into Europe, with special reference to plantations in Belgium and including data on growth and yield.

1303. Numero speciale dedicato alle cupolifere. [**Special number devoted to the Fagales.**] *Monti e Boschi* 6 (11/12), 1955 (487–600). [It.]

Contains a number of articles covering botanical and silvicultural characters, wood properties and uses, and pests, for the following species grown in Italy: *Fagus sylvatica* (*L. Susmel*); *Castanea sativa* (*R. Morandini*); *Quercus robur* (*R. Corti* and *A. Pavari*); *Q. sessiliflora* (*R. Corti* and *A. Pavari*); *Q. pubescens* (*R. Corti* and *A. Pavari*); *Q. conferta* (*R. Corti and A. Pavari*); *Q. cerris* (*R. Corti and A. Pavari*); *Q. trojana* (*R. Corti* and *E. Magini*); *Q. aegilops* (*R. Corti* and *E. Magini*); *Q. suber* (*R. Corti* and *G. Bosetto*); *Q. ilex* (*R. Corti* and *E. Magini*); *Q. coccifera* (*R. Corti* and *E. Magini*) *Carpinus betulus*, *C. orientalis* and *Ostrya carpinifolia* (*C. Pilla*); *Corylus avellana* (*L. Susmel*).

1304. Baltensweiler, W. Vorkommen und wirtschaftliche Bedeutung der Schwarzerle in der Umgebung Zürichs. [**The occurrence and economic**

importance of *Alnus glutinosa* in the neighbourhood of Zurich.] *Schweiz. Z. Forstw.* 106 (1), 1955 (32–49 + 1 plate). 4 refs. [G.f.]

Describes the ecological conditions in which *A. glutinosa* occurs in this area, gives figures of increment and yield, and discusses the uses, demand, marketing etc. of the wood (furniture and particularly industrial model-making).

1305. TYDÉN, H.; NORDSTRÖM, L. **[Birch in Sweden, [with discussion].]** *Svenska SkogsvFören. Tidskr.* 52 (2), 1954 (93–138). 22 refs. [Sw.]

Two papers read at the 1954 annual meeting of the Svenska Skogsvårdsförening on: The use of Birch wood [for pulp]; and Birch as a forest tree; with 23 pages of discussion.

1306. HÄRTEL, O. *Ailanthus glandulosa.* **[*A. altissima.*]** *Zbl. ges. Forstw.* 74 (2), 1955 (95–7). 5 refs. [G.]

A description of the tree, including its timber, and its requirements as to site and climate. Conflicting experiences as to its frost-hardiness may be due to the existence of climatic races.

1307. GROOME, J. S. **Muninga (*Pterocarpus angolensis* D.C.) in the Western Province of Tanganyika. 1. Description, distribution, and silvicultural characters.** *E. Afr. agric. J.* 21 (2), 1955 (130–7).

Includes its % contribution to the *Brachystegia-Pseudoberlinia* woodland, its occurrence in other vegetation types, and notes on natural and artificial regeneration.

1308. SAMAPUDHI, K. **[Teng-rang [*Shorea obtusa*/*Pentacme siamensis*].]** *Vanasarn* 12 (1), 1954 (47–58). 4 refs. [Siam.e.]

A short account of the two species (the general similarity of whose timber has linked their names both popularly and—as 'Burmese Sal'—in the trade), their distribution, habitat and ecology, and the anatomical and mechanical properties of their wood. Natural regeneration by seed and coppice is usually so profuse that, given fire protection, management is easy. Coppice with standards (for fuel) and Selection with Improvement (for timber) are considered the best systems at present.

1309. LONG, A. **Burma Teak.** *Burmese For.* 5 (1), 1955 (11–27). 15 refs. [E.]

A short account of Burma Teak, giving its range and rate of growth and making suggestions for increasing the latter. Methods of encouraging natural regeneration are described and plantation policy discussed.

1310. MAHAPHOL, S. **Teak in Thailand.** *Report, Royal Forest Department, Bangkok* No. *R.*16, 1954. ([*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/54). pp. 31 + 5 maps + 9 photos. 7 refs.

Covers ecology, silviculture, injuries and protection, yield and increment.

181.1. Distribution, Natural Range

See also Nos. 1263, 1299.

1311. ROULEAU, E. ***Pinus rigida* Miller in Quebec.** *Rhodora* 57 (682), 1955 (299). O.B.D.

A natural stand of *P. rigida* is reported from Chateauguay County, Quebec. The occurrence of *P. rigida* in Quebec had previously been considered doubtful.

1312. GODER, H. **Ecology of Hemlock [*Tsuga canadensis*] along its border in Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (83). A.P.B.

Analysis of data taken from surveyors' records and present-day field studies led to the conclusion that fire was the most important factor influencing the location of the border.

1313. ARNBORG, T., and ÅKEBRAND, V. Skogsinventeringar. III. Sällskapets för praktisk skogsförädling undersökning rörande frekvensen av *Betula verrucosa* i förhållande till *Betula pubescens.* **[Forest inventories. III. Research by the Sällskap för praktisk skogsförädling on the frequency of occurrence of *B. verrucosa* in relation to *B. pubescens.*]** *Skogen* 42 (20), 1955 (367–70). [Sw.]

Includes a map showing the relative distribution of the two species in the Swedish counties of Gävleborg, Kopparberg, and Jämtland, marking some of the good quality stands, and lists some of the new discoveries of *B. verrucosa* in Härjedalen and Dalarna (north-westerly mountainous districts where there have been few previous records of it). Some plus and better normal stands of both species have been listed, and the occurrence of curly Birch noted.

1314. ELORRIETA, J. Répartition du châtaignier en Espagne. **[Distribution of *Castanea sativa* in Spain.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/*14-*E*, 1955. pp. 2. [F.] Limited distribution.

1315. GONZALEZ VAZQUEZ, E. Ficha ecológica de la estación de los castañares de Santa Coloma de Farnes. **[Meteorological data on the site of the Chestnut stands of Santa Coloma de Farnes [, Spain].]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/*14-*B*, 1955. pp. 12. [Span.] Limited distribution.

Gives meteorological data for 6 sites.

1316. FERNANDES, C. Rapport sur la carte de répartition du châtaignier au Portugal et renseignements écologiques. **[Report on the distribution map of *Castanea sativa* in Portugal, and meteorological data.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/*14-*A*, 1955. pp. 10. 14 refs. [F.]

Includes tabulated meteorological data for 28 sites.

1317. PAVARI, A. Fiches écologiques du châtaignier en Italie. **[Meteorological data on the Chestnut in Italy.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/14-D*, 1955. pp. 16. [F.] Limited distribution.

Gives data for 7 sites.

1318. WHITE, F. **Distribution of the African species of '*Diospyros*'.** Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (525–40). 6 refs. [E.e.it.]

Outlines, on 10 maps, the distribution of African *Diospyros* (including *Maba*). The 71 known species comprise 28 well defined ones, 8 imperfectly known and 15 'super species' containing from 2 to 5 very closely related species. The rain forests have 43 and other forests 17 (E. African coast 15, E. African montane 2), while 11 occur in non-forest types.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 1120, 1124, 1209, 1211, 1252, 1315–7, 1443 *et seq.*

1319. WETTSTEIN (-WESTERSHEIM), W. Einfluss der Tageslänge auf das Wachstum der Kiefer (*Pinus sylvestris*). **[Influence of day length on the growth of Scots Pine.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (142). [G.]

Presents data on growth and development of plants subjected to an artificially shortened day-length.

1320. ZAHNER, R. **Effect of interrupted dark period on height growth of two tree species.** *For. Sci.* 1 (3), 1955 (193–5). 5 refs.

Seedlings of *Pinus taeda* and *Liriodendron tulipifera* were each divided into two lots, the control being subjected to 9·5 hours of normal daylight followed by 14·5 hours of darkness; the other having this latter period broken in the middle by 30 minutes of 200-watt light. Seedlings of both species subjected to the latter treatment made more than twice the height growth, began it 2–4 weeks earlier and continued it to September, compared with May–June for the control. The interruption or shortening of the dark period is considered, following Wareing [cf. *For. Abstr.* 13 (No. 139)], to prevent the formation of a stable growth inhibitor.

1321. BORMANN, F. H. **Ecological implications of changes in the photosynthetic response of *Pinus taeda* seedlings during ontogeny.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (81). A.P.B.

Measurements of photosynthesis in 16-week-old Loblolly Pine indicated that maximum photosynthetic rates were attained at light intensities far below those required by seedlings ⩾ 2 years old. This decreasing photosynthetic efficiency during the plant's course of development helps to explain the ecological rôle of the species in old fields, where it thrives, and under dense canopies, where it begins growth but ultimately fails.

1322. BROWN, J. M. B. **Ecological investigations: *Rhododendron ponticum*.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (25).

Rhododendron seeds were germinated in pots in open woodland, and grown through 1953 in a series of 5 light intensities ranging from full daylight to less than 1% of full daylight. In the darkest treatment, which would roughly correspond with conditions in a young Douglas Fir stand, growth was greatly reduced, but fungal attack so depleted the pots that accurate data could not be obtained. Significant reductions of dry weight were also recorded at relative light intensities of 5% and 10–12%. Seedlings grown at 40% light intensity had longer but rather smaller leaves and slightly greater dry weight than those grown in the open. It is suspected that this improved growth and vigour of Rhododendron seedlings under moderate shade is due to the favourable microclimate (higher humidity, reduction of wind etc.).

1323. TAKAHARA, S., KAWANA, A., and TANGE, I. **[Influence of light intensity and soil moisture on the shade-endurance in the leaves of Shirakashi seedlings (*Cyclobalanopsis* [*Quercus*] *myrsinaefolia* Oerst).]** *Bot. Mag., Tokyo* 68 (7/8), 1955 (212–5). 15 refs. [Jap.jap.e.] I.M.I.

Four plots of 3-year Shirakashi seedlings, WL, WS, DL and DS were grown for 14 months in a greenhouse, the W (wet) and D (dry) plots with soil at 85 and 25% moisture capacity respectively and the L (light) and S (shade) plots in full, and ca. 13% of full sunlight respectively. The compensation point [where respiration and photosynthesis balance] varied not only with light intensity but also with soil moisture, the variation being small in the W but marked in the D plots. Under the same light conditions this point was strikingly affected by soil moisture, being lower in the W plots. Chlorophyll content was unaffected by soil moisture and was higher in the S than in the L plots. Total N and K_2O were higher in the S plots while ash, SiO_2 and P_2O_5 were higher in the L plots. The leaves of the W plots contained relatively high amounts of total N, SiO_2 and K_2O whereas CaO and MgO were higher in the D plots.

1324. BROWN, J. M. B. **Ecological investigations: shade and growth of Oak seedlings.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (24–5).

Acorns were sown in April 1952 (*a*) in the open, and under shade giving (*b*) 40%, (*c*) 15%, and (*d*) 7% of full light intensity, and results of 2 years' growth were assessed in autumn 1953. These were parallel to those previously reported for Beech under similar, though not identical, conditions [cf. *For. Abstr.* 15 (No. 1185)]. Height growth was significantly greater in (*b*) and less in (*d*) than in (*a*) or (*c*), which differed little. Dry weight was greatest for (*a*), owing to the much greater root development, the root/shoot ratio for (*a*) being 3·14 compared with 1·8 for (*b*). In (*c*) and (*d*), both root and shoot were lighter in weight, but the root/shoot ratio did not differ significantly from that in (*b*). The soil of the nursery was derived from gault clay with a thin veneer of plateau gravel, and the depth of penetration of the clay by the roots of the two-year-old seedling Oaks was often astonishing. The depth was greatest in (*a*) seedlings, some of the more vigorous of which descended more than 3 ft. Treatments (*a*) and (*b*) produced more profuse branching; in all treatments there was no discernible deviation of the main stem from the vertical.

1325. TUMANOV, I. I., and KRASAVCEV, O. A. Morozostoĭkostj drevesnyh rasteniĭ. **[The frost resistance of woody plants.]** *Fiziol. Rast.* 2 (4), 1955

(320–33). 21 refs. [Russ.russ.] [Institut fiziologii Rastenii im. K. A. Timirjazeva Akademii Nauk SSSR, Moskva.] A.P.B.

Describes and discusses laboratory tests on *Pinus sylvestris*, *Picea abies*, *Betula verrucosa*, *Tilia cordata*, *Quercus robur* and horticultural varieties of Apple, in a refrigerator capable of maintaining any desired constant temperature down to — 70° C. The tests were made on 12 dates between Nov. and April; 4 different temperatures were tried on each occasion, and for each test 5–20 one-year shoots per tree were brought in (from trees growing in the open at Moscow, i.e. subjected to natural 'hardening'). The shoots were cooled in ca. 2–3 hours to the desired temperature, at which they were held for 1 hour, brought back in 4–5 hours to a temperature above 0°, and then stood in water in the warm and given continuous electric light for observation of flushing and degree of injury. Control shoots were also brought in for observation under the last conditions. Results are shown in a graph and diagrammatic sketches illustrating the various degrees of injury. Even in hardy species, frost resistance was found to vary widely in the course of the winter. In late autumn, with low temperatures still above 0°, *P. sylvestris* developed high resistance, withstanding — 35°; the least resistant at this time were *P. abies* and *Q. robur*. This represents the first stage of natural 'hardening'; for the second, settled frosty weather is necessary, with daily means of — 10 to — 15°. Temperature variations during the winter have a marked effect on frost resistance, and it was found that not only thaws but also periods of only slight frost could cause decreases in hardiness. *P. sylvestris* was the least affected by such changes; further, when branchlets were brought into favourable conditions, its foliage resumed photosynthesis only after 3–4 days, and its state of winter-hardiness must be relatively stable. *T. cordata*, on the other hand, develops excellent frost resistance but cannot maintain it when external conditions vary. A graph illustrates such variations in hardiness for all species tested. When fully 'hardened', *P. sylvestris*, *B. verrucosa*, *T. cordata* and *P. abies* in the vicinity of Moscow can withstand — 55° without material injury. *P. abies*, however, 'hardened' less well than the other species, and *Q. robur* suffered much damage at this temperature. Differences were found in the resistance of different organs, e.g. in *T. cordata* the buds were more frost-resistant than the shoot. The tests in early spring showed lower resistance even for the hardiest species (*P. sylvestris*) than in comparable weather in the autumn. It is noted that at all times during the tests, temperatures near those causing injury, appeared to hasten the break of dormancy when shoots of the deciduous species [conifers not mentioned in this context] were brought from the refrigerator into conditions favourable to growth. As natural resistance to low temperatures increased, the temperature necessary to produce this effect decreased.

1326. BERNBECK, O. Wind und physiologische Tiefgründigkeit in ihrer Bedeutung für die Bodenkultur. **[Wind and physiological rooting depth and their importance in cultivation.]** Deutsche Bauernverlag, Berlin. 1954. pp. 100. Many refs. [G.] Price *DM.5* (*9s.*).

The first part of the book deals with the influence of the wind on climatic factors, pollination, seed distribution and plant physiology, including both the direct effect of the wind and its drying effect on microclimates, and the effects of sand, salt, snow and ice particles carried by it. Some recent research at Bonn and elsewhere is discussed; subjects covered include transpiration and respiration, and the effect of wind strengths on underground and aerial parts of the plant and on increment. The development of wind-resistant types characterized by short thick stems and thick bark is discussed. The second part deals with the protection of crops against chronic and acute wind damage. Soil depth is one of the most important factors in wind resistance. Physiological rooting depth (depths to which roots can penetrate and thrive), geological rooting depth (depths to which rooting would be possible in optimum, but not in the actual physical and chemical conditions), and physiological shallowness (e.g. where there is too little depth of soil above the water-table, and flooding and root rot are likely to occur) are differentiated. The importance of physiological depth on the development of a favourable root/top relationship to ensure wind resistance, and the factors favouring conversion of soils from shallow to deep rooting types and vice versa are discussed. One of the chief factors in maintaining and improving rooting depth is the maintenance of full stocking. Some figures are given for increase in yield of agricultural crops as a result of protection against wind, and the use in Europe of different forms of windbreak to protect agricultural land is outlined. The final section deals in some detail with measures for protection against wind in forestry. These include the use of wind-resistant species, mixtures, short rotations and uneven-aged stands, shelter plantings and the avoidance of clear felling.

1327. STONE, E. C., and SHACHORI, A. Y. **Absorption of artificial dew: Ponderosa Pine seedlings demonstrate ability to reverse usual procedure of plant transpiration.** *California Agriculture, Berkeley* 8 (12), 1954 (7, 10). L.S.

In a small-scale experiment, roots of 2-year Ponderosa seedlings were washed and dried and placed in tightly sealed glass flasks. The plants were then turned upside down and exposed to a continuous spray. Water started accumulating in the flasks after 12 hours, and continued to do so for ca. 31 days. During that time the roots shrivelled but the tops stayed green and some even grew needles. When seedlings were dried for some weeks before the experiment, no water accumulated. No explanation is attempted. [Cf. *For. Abstr.* 16 (No. 3867).]

1328. STONE, E. C., and FOWELLS, H. A. **Survival value of dew under laboratory conditions with *Pinus ponderosa*.** *For. Sci.* 1 (3), 1955 (183–8). 26 refs.

Pine seedlings were raised with sunflowers in pots, water being withheld when the latter had 12 leaves.

When dead, the sunflowers were cut down and the soil sealed. Half the Pines were subjected nightly to a fine mist, simulating dew. These survived 41 days compared with 21 for the control. In the soil levels occupied by the Pine roots, moisture was generally significantly more among those receiving artificial dew, though lower in both cases than at the time when the sunflowers were removed. Dew may thus help Ponderosa Pine to survive in similar conditions in the field.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 1129, 1136, 1139–49, 1177, 1197, 1202–9, 1217, 1323–4, 1387, 1453, 1551, 1563, 1591, 1626, 1825–6, 2188.

1329. MATJUK, I. S. Vlijanie počvennyh uslovii na rost duba. **[The influence of soil conditions on the growth of Oak.]** *Počvoved.* 1955 (6), (97–9). [Russ.] A.P.B.

Compares sowings of *Quercus robur* (seed spots of 6 acorns each, spaced 1·5 × 1·0 m. in lines) made in 1951 in the Kamensk region (zone of dark-chestnut soils) on (1) light clay-loam to 74 cm. depth, over a seam of reddish-brown light clay, followed at 124–216 cm. depth, by ancient alluvial sand, and (2) light, grey, sandy loam to 48 cm. depth, then reddish-brown compacted sandy loam to 98 cm., over non-transported sand. Plot (1) was in a slight depression and had a higher humus content. At 3 years old, height and diameter growth were considerably better, and the number of seed-spots containing healthy Oaks was higher, for (1). Differentiation in growth of individuals within a seed-spot was more marked in (1) than in (2). [Cf. *For. Abstr.* 15 (No. 2333).]

1330. HUIKARI, O. **Experiments on the effect of anaerobic media upon Birch, Pine, and Spruce seedlings.** *Commun. Inst. for. Fenn.* 42 (5), 1954 (1955). pp. 13. 32 refs. [E.fi.]

In this experiment, seedlings of *Betula verrucosa*, *B. pubescens*, *Pinus sylvestris*, and *Picea abies* were raised on various nutrient media in flasks in (*a*) aerobic and (*b*) anaerobic conditions. The latter had no harmful effect on the development of *B. pubescens* and very little on *B. verrucosa*. Pine and Spruce seedlings in (*a*) were distinctly superior to (*b*). The results are held to show that the complete absence of trees on some swamps is not attributable to the anaerobic condition of the soil. Experiments effected with the aid of methyl blue indicator beneath the paraffin-wax seal of (*b*) showed that (for Birch) reducing conditions prevailed beneath its surface, which seems to indicate that Birch seedlings must be capable of conveying O from the shoot to the roots. The same phenomenon may occur in Pine and Spruce seedlings too, but to a lesser degree. Since the species employed in the experiment are not known to have any structural features to which the conveyance of O could be attributed, it seems clear that it is carried from the shoot to the roots in solution in the sap conducting assimilates in this direction. The poorer performance of coniferous species on anaerobic soils may be due to the inferiority of tracheids to the sieve-tubes of deciduous species as a channel for the dissolved O. On the basis of this experiment and of the literature, it is concluded that the poor growth of trees on swamps is not directly due to O deficiency in the soil, and the author holds that it supports the view earlier expressed by him, that the beneficial effect of swamp drainage is due to the increased mobility of the soil water.

1331. THEMLITZ, R. Zur Frage der Ausnutzung des von Rohhumus aus Ammoniak in fester Bindung aufgenommenen Stickstoffs und der Stickstoffaufnahme aus schwefelsaurem Ammoniak und Kalkammonsalpeter in Gegenwart von Rohhumus durch Nadelholzsämlinge. **[The utilization by conifer seedlings of bound N taken up by raw humus from NH_3, and their N uptake from ammonium sulphate and calcium-ammonium-nitrate in the presence of raw humus.]** *Z. PflErnähr. Düng.* 70 (3), 1955 (207–20). 17 refs. [G.g.] [Institut für forstliche Bodenkunde, Hann.-Münden.] O.R.S.

Pot-grown conifer seedlings (40 per pot; in various mineral soils, with or without an admixture of raw humus) were given different fertilizer treatments, including N from different sources, and were weighed and analysed after one growing season. (1) Spruce seedlings failed to obtain sufficient N from $CaCl_2$-treated 'ammonia raw humus', i.e. humus limed to encourage mineralization and the uptake of additional N from gaseous NH_3, and then treated with $CaCl_2$ to remove most of the loosely held N. (2) [In this and the remaining treatments, 'humus' means 'natural, untreated raw humus'] Spruce seedlings treated with $(NH_4)_2SO_4$ in the presence or absence of humus showed weights very similar to those in (1), but a much higher uptake of N, both seedling weight and N uptake being slightly higher in the presence of humus. (3) Weights of Pine seedlings treated with calcium-ammonium-nitrate (KAS), with or without humus, were low and very similar for all treatments; the highest dosage (161·6 mg./pot) reduced seedling weights. Uptake of N by the seedlings was high, increasing with dosage, and higher in the presence of humus than in its absence. (4) Pine seedlings given humus, with or without KAS, showed increased weight when pH was raised from 3·69–4·17 to 5·16–5·37 by adding 900 mg. CaO per pot; the addition of 30 mg. P_2O_5 as well as CaO gave still higher weights especially for seedlings receiving humus and KAS. N uptake from KAS was high for all seedlings with or without humus. It was especially high in the series with P_2O_5. General conclusions drawn from seedling weights, N uptake and chemical contents are that N treatments are unproductive if other nutrients, especially Mn, are not brought to a satisfactory level.

1332. LEYTON, L., and ARMSON, K. A. **Mineral composition of the foliage in relation to the growth of Scots Pine.** *For. Sci.* 1 (3), 1955 (210–8). 22 refs.

[Cf. *For. Abstr.* 15 (No. 1321).] Significant linear correlations were found between total height growth and the dry weight % of various nutrients in

needles of different age taken from various points of the crown of 9-year *Pinus sylvestris* growing on heathland. In terminal-shoot needles, N, P and K contents all had such correlation. The degree of differentiation between trees of different height in terms of nutrient concentration in the current season's needles was greatest in the terminal shoots and decreased progressively down the crown; with the exception of K, no differentiation was found in older needles. Thus current season's needles from as near the terminal shoot as possible should be selected for foliar analyses. For all needle samples, tree height can be significantly related to needle composition (N, P, K, Ca and other ash constituents) by multiple regressions. The best estimate, with terminal-shoot needles, gives a multiple correlation coefficient of 0·972 ± 1·12 ft. Tests for each nutrient suggest that in the terminal-shoot needles at least, only N and K make significant contributions and for these, 11·79 N + 5·70 K − 10·18 (N and K stated as % dry weight) provides an estimate of tree height in feet with a standard error of ± 1·41. Thus the growth of these Pines is probably limited by deficiencies in N and K in so far as increased concentrations of these, independent of the concentrations of other nutrients within the range encountered, are associated with increased height-growth. A significant linear component was established between the total dry weight of the aerial parts of the trees and height. These weights can also be expressed in regressions on nutrient concentration with functions more or less in agreement with those for height.

1333. BOND, G. **An isotopic study of the fixation of nitrogen associated with nodulated plants of *Alnus, Myrica* and *Hippophaë*.** *J. exp. Bot.* 6 (17), 1955 (303–11). 9 refs. O.B.D.

Nodulated plants of *A. glutinosa*, *Myrica gale* and *Hippophaë rhamnoides*, the root systems of which had been exposed to excess free ^{15}N, showed substantial enrichment in fixed ^{15}N content in all parts of the plant, but particularly in the root nodules. The data support the conclusion that the nodules of these non-legumes are similar to those of legumes in their function and relation to the rest of the plant. Nodulated plants of *A. glutinosa* and *M. gale* continued to fix free N currently with the uptake of combined N supplied via the rooting medium, in amounts unlikely to be exceeded in the field. Isotopic tests on detached nodules of *A. glutinosa* showed that fixation continued, and although it was much reduced when compared with that of attached nodules, it considerably exceeded (so far as experiments have shown to date) that of detached legume nodules when measured on the basis of fixation per unit of total nodule N. [Cf. *For. Abstr.* 17 (No. 223).] *From author's summary.*

1334. HARLEY, J. L., and BRIERLEY, J. K. **The uptake of phosphate by excised mycorrhizal roots of the Beech. VII. Active transport of ^{32}P from fungus to host during uptake of phosphate from solution.** *New Phytol.* 54 (3), 1955 (296–301). 5 refs. [Department of Botany, Oxford University.] O.R.S.

[Cf. *For. Abstr.* 16 (No. 227).] (1) Experimental evidence is set out which shows that active transport of ^{32}P from fungus to host is reduced in rate when roots are washed in buffer solutions containing [unlabelled] phosphate. When roots have been returned to phosphate-free buffer after a period in buffer containing phosphate, active transport, temporarily reduced, is resumed at a rapid rate. (2) Phosphate-charged roots kept in phosphate-free buffer until the rate of transport had reached a low level, showed an increased transport rate after they had been charged a second time. (3) It is suggested that the phosphate absorbed from the external solution competes successfully for a substance produced by respiratory metabolism, so that phosphate accumulated in the sheath is not mobilized. In the absence of external phosphate supply, the phosphate already accumulated in the sheath is utilized. Movement of P into the core is mainly from the external solution when this contains phosphate, but is from the sheath phosphate when the external supply fails. *Authors' summary.*

1335. SOBOTKA, A. Pěstování mykorrhizních hub v čistých kulturách. **[Growing mycorrhizal fungi in pure cultures.]** *Sborn. čsl. Akad. zeměd. (rost. Výroba)* 28 (3/4), 1955 (332–5). 5 refs. [Cz.cz.] C.G.B.

Describes the results of isolation and cultivation of pure cultures of the following fungi: *Amanita* (5 spp.), *Ixocomus* (3 spp.), *Krombholzia* (2 spp.), and *Xerocomus*, *Boletus* and *Lactarius* (1 sp. each).

1336. BOKOR, R. A mykorrhiza-gombákkal történö talajoltások új agrotechnikai eljárása. **[A new method of soil inoculation with mycorrhizal fungi.]** *Erdész. Kutatás., Budapest* 1954 (4), (27–45 + smries. in suppl.) 17 refs. [Hu.e.g.russ.]

Basidiospores of mycorrhizae, isolated from Scots and Austrian Pine, were germinated directly on a medium of malted barley and potato starch in the proportions of 150/15 g. Pure cultures, developed by a technique of dilution and re-inoculation, were added to sterilized soil, which was sown, 14 weeks later, with Pine seed pretreated with 2% $KMnO_4$. The fungi which retained their symbiotic characteristics under saprophytic conditions developed as true mycorrhizae. These were observed to produce copious quantities of water and CO_2 from soil organic matter, suggesting that these fungi play an important role in the water economy of the soil, particularly under conditions of drought, and may contribute to soil porosity. Mycorrhizal fungi supplementary to those on record for Austrian Pine are listed, including 4 species of *Boletus* and *Amanita*, 3 *Lactarius* and 3 *Russula*; these, with two exceptions, also form mycorrhizae with Scots Pine. The mode and course of infection are described and discussed, with numerous illustrations.

1337. PACHLEWSKI, R. Badania mykotrofizmu jesiona wyniosłego (*Fraxinus excelsior* L.) z uwzględnieniem warunków ekologicznych i fitocenotycznych. **[Investigations into the mycotrophy of Ash under varying ecological and plant-sociological conditions.]** *Ekologia Polska, Warszawa* 2 (2), 1954 (151–64). 12 refs. [Pol.russ.g.] BL.U.

Roots from trees and seedlings grown in *Alnetum fraxinosum, Alneto-Betuletum* and *Alno-carpinetum*, and also from parks, roadsides, house ruins and nurseries in various parts of Poland were examined. The author found that, up to 10 months, seedlings were autotrophic, whereas older seedlings and mature trees were mycotrophic with endotrophic mycorrhizae of tolypophagous and, to a lesser extent, thamniscophagous type; the latter occurred only outside the natural associations, e.g. on the ruins of Wrocław. Mycorrhizae developed best under growth conditions favourable to the tree. Only in the *Alneto-Betuletum* of Białowieża forest could ectotrophic mycorrhizae of the A-type be discovered. Soil acidity appeared to have no influence on mycorrhizal development. Ash roots developed in water were always autotrophic. Root-hairs on mycotrophic roots showed impeded development. *From author's summary.* [Cf. *For. Abstr.* 15 (Nos. 2331, 2332).]

1338. WILCOX, H. **Regeneration of injured root systems in Noble Fir.** *Bot. Gaz.* 116 (3), 1955 (221–34). 14 refs. O.B.D.

The period of most active root repair in the 1- to 3-year old seedlings studied is from June to September. A few seedlings regenerate roots in February and March also. Root regeneration has no relation to shoot growth. In Noble Fir, root pruning does not result in a compact fibrous root system, severance having no effect on the number of laterals, only on the origin of replacements near the pruned surfaces. Such regenerated roots elongate rapidly, and their distal portions are likely to be lost in transplanting. A root pruned at the 1- to 3-year-old level generally produced a number of regenerated roots equal to the number of xylem poles in the mother root. Older roots can produce many more roots at the wound level than there are xylem poles in the parent root. Features of the wound-healing process and the origin of lateral-root primordia are described. *From author's summary.*

1339. MEYER-BRENKEN. Wurzelausbildung der Roteiche. **[Root development of *Quercus borealis*.]** *Forst- u. Holzw.* 9 (22), 1954 (464–5). [G.]

Describes and illustrates the root systems of a 62- and a 26-year-old tree, both from a site on early-diluvial sandy soil with a substratum of boulder clay in Oldenburg. Their primary systems reach only about 60 cm. deep, and they have no taproots, but extensive lateral roots.

1340. HELLMERS, H., HORTON, J. S., JUHREN, G., and O'KEEFE, J. **Root systems of some chaparral plants in southern California.** *Ecology* 36 (4), 1955 (667–78). 23 refs.

A study was made of the roots of 18 species of shrubs and sub-shrubs found in the chaparral of southern California. Roots spread wider than branches in all species studied. Roots of many species grew uphill parallel to the soil surface. Root-grafting was found in only one species, *Quercus dumosa*. Nodules were found on the roots of all *Ceanothus* species. *From authors' summary.*

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See Nos. 1312, 1390, 1405–6, 1603.

181.5. Reproductive Behaviour

See also Nos. 1299, 1320–4, 1428 *et seq.*, 1551.

1341. SCAMONI, A. Berichte über den gegenwärtigen Stand unseres Wissens vom Pollenflug der Waldbäume. **[The present state of our knowledge concerning pollen dispersal in forest trees.]** *Z. Forstgenet.* 4 (4/5), 1955 (145–9). 30 refs. [G.g.e.f.]

Lists and discusses world literature published since 1918.

1342. WRIGHT, J. W. **Genetic implications of long-distance pollen transport.** *Z. Forstgenet.* 4 (4/5), 1955 (126–8). 7 refs. [E.e.g.f.]

Discusses the question whether long-distance pollen transport is effective in preventing genetic differentiation of geographically separated populations.

1343. PERSSON, A. Frequenzen von Kiefernpollen in Südschweden 1953 und 1954. **[Dispersal of Pine pollen in Sweden in 1953 and 1954.]** *Z. Forstgenet.* 4 (4/5), 1955 (129–37). 20 refs. [G.g.e.f.]

Data are presented from a large number of collecting points in the Barsebäck-Vittskövle region in Skåne. Results for these two years differ widely. In 1953 ♂ flowering was good, in 1954 it was profuse. In 1953 values decreased with increasing distance from the source, and were fairly constant at different collecting points. Average pollen concentration at a distance of 700 m. from the source was ca. 10% of the maximum value measured. In 1954, however, the pollen appeared to travel over large distances, since values sank relatively little with increasing distance from the source. Taking the value at the stand margin as 100, the relative value at 100 m. distance was 95. On the farther side of a Birch shelterbelt 100 m. wide it rose to 112. Values within 2 Birch shelterbelts were 20 and 38% respectively of those in the open in the immediate neighbourhood. In 1954, however, concentrations were relatively high at a distance of only 30 m. from the shelterbelt.

1344. SCHMITT, R. Über die Verbreitung des Pollens von *Pinus silvestris* L. **[The dispersal of *P. sylvestris* pollen.]** *Z. Forstgenet.* 4 (4/5), 1955 (142–5). 10 refs. [G.g.e.f.]

Presents the results of measurements taken at various distances from an isolated Pine stand. On the basis of preliminary results an isolation distance, for tree-breeding purposes, of 1000 m. is recommended.

1345. DENGLER, A. Über den Pollenflug und seine Ausfilterung innerhalb von Waldbeständen. **[Pollen dispersal and the filtering effect of forest stands.]** *Z. Forstgenet.* 4 (4/5), 1955 (107–10). [G.g.e.f.]

In order to study the influence of forests in impeding pollen movement through the air, pollen traps were set in 1936 in Eberswalde, (1) in the open, (2) in a young Douglas Fir stand, mixed with

Lawson's Cypress and well enclosed on the forest margin by young deciduous species, and (3) in a mature Beech stand. The filtering effect was highest in (2), the pollen trapped being only 14·5% of that taken in (1); and much less in (3), where 64% was trapped. Further trials in 1938 confirmed that a fair amount of pollen penetrated into mature Pine, Pine/Beech and Beech stands, whereas dense young stands exercised a strong filtering effect.

1346. SCAMONI, A. Beobachtungen über den Pollenflug der Waldbäume in Eberswalde. **[Pollen dispersal from forest trees in Eberswalde.]** *Z. Forstgenet.* 4 (4/5), 1955 (113–22). 7 refs. [G.g.e.f.]

Collections were made at different times over the years 1933–1936 and 1949 with glycerine-gelatine pollen traps, and the findings correlated with meteorological data. For Alder, which flowers at an unfavourable time of year, temperatures 10 days before the beginning of pollen dispersal were of the greatest importance. Quantities varied widely from year to year. Maximum amounts of Elm pollen in the air coincided with warm, dry weather. The beginning of dispersal hardly differed from year to year. With Birch, up to 2 weeks' difference was noted in the date, which depended upon the weather of the preceding 30 days. Amounts varied widely from year to year, maxima coinciding with warm, dry and, to some extent, windy weather. Hornbeam, in the years when measurable amounts of pollen were trapped, showed a maximum coinciding with warm weather. Pollen from Beech was only taken in measurable amount in 2 years, in one of which the maximum coincided with high winds. Oak produced considerable amounts of pollen in 1 year only, 2 peaks being reached, one coinciding with dry, sunny weather, and the other with windy weather. The traps collected moderate amounts of Spruce pollen in 1 year only, the maximum being reached in warm weather. The beginning of pollen dispersal from Pine varied considerably, depending on the weather of the preceding 10 days. Maxima were reached on warm, sunny and windy days. Amounts also varied widely in different years. It can generally be assumed that the process of pollen dispersal is aided by sunny and dry weather and impeded by humid and rainy conditions. No close correlation with windy weather could be established.

1347. SARVAS, R. Ein Beitrag zur Fernverbreitung des Blütenstaubes einiger Waldbäume. **[On long-distance dispersal of pollen from some forest trees.]** *Z. Forstgenet.* 4 (4/5), 1955 (137–42). 16 refs. [G.g.e.f.]

Dispersal of pollen of *Betula verrucosa, B. pubescens* and *Pinus sylvestris* was studied in Pine stands on the coast near Helsinki, and on a lightship 20 km. S. of Helsinki. Amounts deposited on the lightship were surprisingly large compared with those on the mainland—for Birch even higher than on shore. The author believes this to be due to the fact that convection currents cease over the sea, and turbulence is greatly reduced, so that when clouds of pollen reach the sea they are deposited comparatively rapidly. The pollen, on the whole, does not travel far from the shore. The large deposits of pollen found in this and other cases upon lightships, is not evidence of the long distance travelled by pollen, but of the arresting effect of the sea upon its flight.

1348. BÁNÓ, I. Egy erdeifenyö anyafa vizsgálata magtermö ültetvény létesítése szempontjából. **[A Scots Pine examined for its suitability as [a source of grafts for] a seed-orchard.]** *Erdész. Kutatás., Budapest* No. 3, 1954 (73–82 + smries in suppl.). [Hu.e.g.russ.]

The author examined in detail a specimen of *Pinus sylvestris* to determine which branches were likely to produce a good cone yield. The tree, 23 years old, 7 m. high, and 13 cm. d.b.h. when examined, came from a pure closed stand known to yield well. The author distinguishes, and gives measurements for, 4 kinds of growth: shoots growing strongly; shoots bearing ♀ flowers; shoots bearing ♂ flowers; dying shoots; and presents in tables and a series of coloured diagrams, the theoretical and actual shoot production, the position of 1st- and 2nd-year cones and their number in relation to shoot length and diameter for the top 8 whorls of branches. An attempt is made to correlate cone production with shoot and bud dimensions and side-bud number. It is shown that in all 8 whorls the majority of conelets were produced on shoots in their second year and that the most promising scions should come from cone-bearing shoots 3–4 mm. thick and 5–10 cm. long.

1349. MOROHIN, D. I. Massovoe razvitie šišek na verhušečnom dvuhletnem pobege sosny. **[Mass development of cones on a terminal, 2-year-old shoot of *Pinus sylvestris*.]** *Priroda, Moskva* 44 (9), 1955 (118–9). 1 ref. [Russ.] A.P.B.

Illustrates a shoot on which, for some unknown reason, 18 cones were produced in the axils of the scale leaves below the whorl of the current year, i.e. replacing the normal needle-bundles (short shoots). Draws attention also to the occasional production of long shoots from short shoots in *P. sylvestris* and *P. contorta* when the terminal bud is damaged. This latter abnormality is also frequent on young trees bud-pruned by Krotkevič's method.

1350. GODLEY, E. J. **Monoecy and incompatibility.** *Nature, Lond.* 176 (4494), 1955 (1176–7). 6 refs.

Adduces examples of apparent physiological self-incompatibility in monoecious species—*Castanea crinita, C. mollissima* and *Hevea brasiliensis.*

1351. CRAM, W. H. **Self-compatibility of *Caragana arborescens* Lam.** *Repr.* from *Canad. J. Bot.* 33, 1955 (149–55). 14 refs.

1352. MATTHEWS, J. D. **Production of seed by forest trees in Britain.** *Rep. For. Res. For. Comm., Lond. 1953/54,* 1955 (64–78). 50 refs.

Gives a short account of some of the factors affecting the flowering and fruiting of forest trees, and summarizes 5 years' observations on the flowering and fruiting of the more important (native and exotic) tree species in Britain. Data on 28 species commonly planted in Britain are tabulated, showing age at first flowering, first good seed crop and

maximum seed production, intervals between good seed years and between poor seed years, date of flowering, and recommended times of seed collection.

1353. Matthews, J. D. **The influence of weather on the frequency of Beech mast years in England.** *Forestry* 28 (2), 1955 (107–16). 36 refs.

Records of Beech (*Fagus sylvatica*) masts for the period 1921–50 are compared in a table with the temperature, rainfall, and sunshine figures of the 5 months, May to September, of the preceding summer. Significant correlations are shown to exist between the size of mast and (i) July air temperature and (ii) July sunshine. Other factors affecting mast are considered and in particular the damaging effect of spring frosts to the flowers of Beech. *From author's summary.*

1354. Fraser, J. W., and Farrar, J. L. **Effect of watering, shading, seed-bed medium, and depth of sowing on Red Pine germination.** *Tech. Note For. Br. Can.* No. 15, 1955. pp. 3. 1 ref.

Results were much the same as for a similar study with Jack Pine. [Cf. *For. Abstr.* 16 (No. 242).]

1355. Molotkovskiĭ, G. H. Ènergija prorastanija i vshožestj plodov duba i greckogo oreha v zavisimosti ot ih položenija v počve. [**The germinative energy and capacity of seeds of *Quercus rubra* and *Juglans regia* as related to their position in the soil.**] *Dokl. Akad. Nauk SSSR* 102 (3), 1955 (637–9). 2 refs. [Russ.] A.P.B.

Briefly reports the results of experiments in 1952 and 1953 in which seed from a single tree of each of the two species was sown at uniform depth: (1) apex upwards—i.e. embryo inverted, with radicle upwards; (2) horizontally; and (3) apex downwards. Tests were made in the greenhouse and in the open, with 100 seeds to each variant. Results (tabulated) show that, for both species, germinative energy and capacity were highest for (1) and lowest for (3), and in most cases the height of the seedlings at the end of the test decreased in the same order. It is not clear how disturbance of the natural polarity exerts these effects, though preliminary biochemical analyses indicate that in (1) some substances are transferred in a direction opposite to the normal polarity.

1356. Polacsek, K. Die Entwicklung der Buchenverjüngung im Wienerwald nach dem Mastjahr 1946. [**Natural regeneration of Beech in the Wienerwald after the 1946 seed year.**] *Zbl. ges. Forstw.* 73 (1/2), 1954 (35–72). 48 refs. [G.g.]

To assess the influence of various factors on the survival and growth of seedlings, numerous plots of 1 to 4 sq. m. were staked out and kept under observation from autumn 1947 to spring 1951. Apart from the factors (chiefly soil) already discussed [cf. *For. Abstr.* 15 (No. 2346)] exposure to wind was of high importance, resulting in a noticeable superiority of N. and N.E. aspects. Slope affected regeneration unfavourably if $> 20°$. Litter, unless excessive, assisted survival and particularly growth. There was a marked correspondence between site quality as indicated by the ground flora and the success of regeneration. Site classes were similarly reflected, but not the age of parent stands, except for poor results in stands aged < 70 years, possibly through lower seed production or because of their density; stockings of 0·9 to 1 always lowered the plant %. Mean number of seedlings per sq. m. varied from 1116 in the highest of 5 regeneration classes, into which the plots were originally grouped, to 36 in the lowest, with an average of 250; corresponding figures for the 4th year were 171, 13 and 52. Plant losses decreased from a mean of 40% to a mean of 5% over that period. Total failure was rare. The influence of environmental factors increased over the period of observation.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 1299, 1458, 1535, 1612, 1617.

1357. Orshan, G. **Note on the application of Raunkiaer's system of life forms in arid regions.** *Palest. J. Bot.* (*J. Ser.*) 6 (2), 1953 (120–2). 8 refs.

Tabulates for the (increasingly arid) Mediterranean, Irano-Turanian and Saharo-Sindian regions of Palestine the dominant species in % of (*a*) therophytes (perennating as seeds), (*b*) whole-shoot shedders (crypto- and hemi-cryptophytes), (*c*) branch shedders (most chamae- and some phanerophytes) and (*d*) leaf shedders (most phanero- and some chamaephytes). (*a*) and (*b*) are drought-escaping; (*c*) and (*d*) drought-enduring. With increasing aridity (*a*) and (*c*) increase while (*b*) and (*d*) decrease, the latter disappearing completely. [Cf. *For. Abstr.* 17 (No. 2807).]

1358. Leibundgut, H. Untersuchungen über Augusttrieb- und Zwieselbildung bei der Fichte. [**Studies of Lammas-shoot formation and forking in Spruce.**] *Schweiz. Z. Forstw.* 106 (5), 1955 (286–90). [G.f.]

Spruce seedlings raised in the nursery from commercial seed were graded according to height and planted out in three groups: (*a*) plants with Lammas shoots, (*b*) plants without Lammas shoots, and (*c*) mixed plants. Height growth was measured for 3 consecutive years and the data analysed statistically. The results confirmed Schädelin's observation that Spruce with Lammas shoots have a strong tendency to forking; they also proved to have a relatively rapid height growth—average height after 3 years 390 cm. compared with 294 cm. for (*b*).

1359. Saarnijoki, S. Über ein Gruppenvorkommen von Trauerfichten, *Picea abies* (L.) H. Karst. f. *pendula* Jacq. & Hérincq. [**A group of weeping Spruce, *P. abies* f. *pendula*.**] *Commun. Inst. for. Fenn.* 42 (3), 1954 (1955). pp. 42. 70 refs. [G.fi.]

A detailed study of the form, increment, and wood anatomy of a group of 31 Spruce of the weeping form occurring in a normal stand. The tabulated data include height, d.b.h. and crown dimensions for each individual, and age at breast height for half of them.

1360. Müller, D. Die Blätter und Kurztriebe der Buche. [**Leaves and short shoots of Beech.**] *Forstl. Forsøgsv. Danm.* 21 (3), 1954 (319–26). 13 refs. [G.g.]

Investigations on leaves and shoots from 25-, 46- and 85-year-old trees showed that: (1) 48–92% (mean 70%) of the leaves are on short shoots (annual shoots < 0·5 cm. long); (2) some short shoots carry only shade leaves, others only sun leaves; (3) the most typical shade leaves (1 g. fresh weight = 130 sq. cm. leaf area measured on one surface) always occur on short shoots; (4) the most typical sun leaves (1 g. fresh weight = 50 sq. cm. leaf area) always occur on long shoots; (5) on average, 1 g. fresh weight of leaves from 24- to 85-year Beech has in August a leaf area of 80 sq. cm.; (6) the greater part of the material used in stem increment is derived from photosynthesis by the short-shoot leaves; (7) the total weight of short shoots in Danish Beech forests is estimated to be of the order of 0·4 tons dry matter/ha.

1361. MÜLLER, D. Die Atmung der Buchenblätter. **[Respiration of Beech leaves.]** *Forstl. Forsøgsv. Danm.* 21 (3), 1954 (303–18). 15 refs. [G.g.]

From measurements on sample plots in 25-, 46- and 85-year Beech, and field and laboratory work on individual trees, figures were obtained for respiration of sun and shade leaves and of leaves of different ages, weight of leaves and leaf area per ha., and respiration over 24 hours for different mean temperatures. Respiration by 1 kg. leaves, fresh weight, over 24 hours at 15° C. was 6·8 g. CO_2. By correcting this figure for mean monthly temperatures in the leafy period (11 May–16 Oct.), a total respiration of 1192 g. CO_2 (683 g. dry material) per 1 kg. leaves, fresh weight, was found. The annual dry material lost by leaf respiration per ha. was calculated at 4985 kg. for the two stands (25 and 85 years old) which carried ca. 7·3 tons of leaves (fresh weight)/ha.

1362. MØLLER, C. M., MÜLLER, D., and NIELSEN, J. **Respiration in stem and branches of Beech.** *Forstl. Forsøgsv. Danm.* 21 (3), 1954 (273–301). 54 refs. [E.e.]

Respiration of stem and branches of 25-, 46- and 85-year-old Beech was investigated by putting sections of these parts, with the cut surface coated with lanolin, into containers and analysing the CO_2 content of the air at intervals. The annual loss of dry matter through respiration per ha. for Beech woods of site index 2 was calculated at 5·8, 3·5 and 2·0% of dry matter in stem and branch for the 3 age classes respectively, or 3·5, 4·5 and 4·6 tons/ha. The respiration per sq. m. surface area of the stem section increased slightly with increasing diameter.

1363. MØLLER, C. M., MÜLLER, D., and NIELSEN, J. **Loss of branches in European Beech.** *Forstl. Forsøgsv. Danm.* 21 (3), 1954 (253–71). 11 refs. [E.e.]

Fallen branches were collected at 2-monthly intervals over a period of 6 years from an enclosed sample plot, and their volume was determined by water displacement. The main probable sources of error are discussed. Correction factors were calculated for two of these, viz. the losses of volume caused by drying and by initial decomposition by bacteria and fungi. Even with these corrections, values found are too small and an addition of 15–20% to the corrected figure should be made for errors in volume measurement and for the effect of loss of bark, uncollected branch stubs, and the smallest twigs, which escaped collection. The average annual loss for the 6 years was 1·74 cu.m. or 0·98 tons dry matter/ha., or after 20% correction, 2·1 cu.m. and 1·2 tons. These last figures are equivalent to 0·8% of the total stand volume above ground (minus the leaves) or 12·8% of the annual increment in stem plus branches. These figures are compared with some from earlier investigations. The annual loss of branches was found to be about 5·4% of the total branch volume on the sample plot.

1364. MØLLER, C. M., MÜLLER, D., and NIELSEN, J. **Graphic presentation of dry matter production in European Beech.** *Forstl. Forsøgsv. Danm.* 21 (3), 1954 (327–35). 18 refs. [E.e.]

[Cf. preceding abstracts.] Data from analyses on even-aged stands, 8, 25, 46 and 85 years old, are tabulated to show the annual loss of roots, branches and leaves, loss of dry matter by respiration in roots, stem and branches, and increment above and below ground, the sum of all these being the gross annual production per ha. These figures are also presented graphically. Gross production reaches a maximum of 23·5 tons dry matter per ha. annually at 40–60 years. Net production by the leaves (i.e. gross production less loss of leaves and loss of dry matter by leaf respiration) reaches a maximum of 16·2 tons dry matter, also at 40–60 years. About 60% of the gross production is lost by respiration and by loss of roots, branches and leaves, while the remaining 40% represents increment above and below ground. Older stands show a slight increase in loss of dry matter and a decrease in gross production.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

1365. BOULLEY, P. La longévité du pin laricio de Corse. **[The longevity of *Pinus nigra* var. *calabrica*.]** *Rev. for. franç.* 7 (12), 1955 (853–4 + 1 photo). [F.]

Details of a tree felled in Corsica (height 36 m., d.b.h. 1·8 m.) which is estimated to have been 900–1000 years old.

181.8. Phenology

See also Nos. 1214–6, 1299, 1319–20, 1325, 1346, 1352, 1852, 1940.

1366. ROHRHOFER, J. Über das sogenannte Laubmarch. **[On the 'leaf-limit'].** *Zbl. ges. Forst- u. Holzw.* 72 (2/3), 1954 (180–6). 7 refs. [G.]

Describes observations on the flushing of Beech in the Enns valley district of Upper Austria, characterized by a contour line at altitudes between ca. 730 and 830 m., so noticeable that it has a local name, where the leaf-flush, progressing up the slope, comes to a halt for several days, independently of the weather. Meteorological and climatic aspects are touched upon.

1367. MIKULKA, B. Spät- und frühtreibende Buchen im Sihlwald. **[Late- and early-flushing**

Beech in the Sihlwald.] *Schweiz. Z. Forstw.* 106 (11), 1955 (666–70). 4 refs. [G.]

Detailed observations and measurements of 267 Beech trees, classified as early, medium and late flushing, failed to establish any close correlation between this character and increment, stem form, branching habit etc. [Cf. *For. Abstr.* 15 (No. 3367).]

1368. BREMER, H. Der Laubfall der Bäume in seinen Beziehungen zu Standort und Konstitution. **[Leaf fall in relation to site and vigour.]** *Gartenbauwissenschaft, München* (*n.s.*) 1 (3), 1955 (402–9). 7 refs. [G.g.] C.G.B.

Most tree species tend to shed their older, i.e. generally their inner, leaves first unless disturbed by outside factors, such as heat, lack of moisture, frosts and winds. Some species show a more constant pattern than others. Any deviation from the pattern is of diagnostic value, being frequently the sign of a weakened constitution. *From author's summary.*

182. Synecology, Plant Sociology: General, Principles and Methods

See also Nos. 1299, 2305.

182.1. Palaeoecology. History of Vegetation

See also Nos. 1143, 1299, 1384.

1369. NEĬŠTADT, M. I. K istorii lesov severnogo sklona Boljšogo Kavkaza v Golocene. **[The history of the forests of the Northern slope of the Great Caucasus range during the Holocene.]** *Dokl. Akad. Nauk SSSR* 102 (3), 1955 (617–9). 5 refs. [Russ.] A.P.B.

Pollen and spore analysis of a peat section (3·2 m.) in the Tarskoe bog, N. Ossetia, showed a rich flora including 20 woody species. Despite a decline in Beech during the latter half of the period, Beech and Alder dominate throughout, with Hornbeam as a constant associate. The high % of Alder reflects the local topography, and it seems that the forests of the region have been essentially the same as at present (Beech with much Hornbeam) since perhaps 5000–6000 years ago, when the bog originated.

1370. GRIČUK, M. K istorii rastiteljnosti v basseĭne Angary. **[The history of the vegetation of the Angara basin.]** *Dokl. Akad. Nauk SSSR* 102 (2), 1955 (335–8). 4 refs. [Russ.] A.P.B.

Distinguishes 8 phases in the vegetational history of the region since the late Pliocene, illustrating the succession with a pollen diagram.

1371. HANSEN, H. P. **Postglacial forests in south central and central British Columbia.** *Amer. J. Sci.* 253 (11), 1955 (640–58). 22 refs. O.R.S.

1372. HEUSSER, C. J. **Pollen profiles from the Queen Charlotte Islands, British Columbia.** *Canad. J. Bot.* 33 (5), 1955 (429–49). 44 refs. O.R.S.

1373. LIVINGSTONE, D. A. **Some pollen profiles from Arctic Alaska.** *Ecology* 36 (4), 1955 (587–600). 29 refs.

About 50 pollen and spore types were identified. The principal pollen types were *Betula, Alnus, Picea, Salix*, and Cyperaceae. Vegetational changes during the time represented by the samples studied appear to have been much less striking than those of the temperate zone during the same period.

1374. BOSE, M. N. **Some Tertiary plant remains from Queensland, Australia.** *Bot. Notiser* 108 (3), 1955 (381–90 + 2 plates). 23 refs. [E.e.] O.B.D.

These include two species of *Araucaria* having recent counterparts in New Caledonia, and two new species of *Athrotaxis*, having recent counterparts in Tasmania. *From author's summary.*

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 1390, 1397–9, 1404–6.

1375. MERKLE, J. ***Abies concolor* (White Fir) a growing problem in the west.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (80). A.P.B.

This species occurs at altitudes of 6000 to 11,000 ft., but in northern Arizona the range is ca. 8200–9200 ft. on the Kaibab Plateau, and higher on the San Francisco Mountains. Associated with it are Ponderosa Pine at its lower levels and Douglas Fir, Alpine Fir, Engelmann Spruce and Aspen at the higher levels. Fire prevention by federal and state agencies of late has resulted in a large increase in its numbers and extent, with a consequent decrease in Ponderosa Pine regeneration and in the amount of browse for deer and pasture for livestock. A management programme is needed to control White Fir and reduce its present area.

1376. KOECHLIN, J., and TROCHAIN, J. L. Sur l'existence d'un postclimat forestier au Moyen-Congo. **[The existence of a forest post-climax in the Middle Congo.]** *C.R. Acad. Sci., Paris* 241 (3), 1955 (329–31). 1 ref. [F.] O.R.S.

A study of the remaining forest areas near Brazzaville and of natural regeneration in the savanna in the absence of fire, suggests that the local climate is suitable for forests. Remnants of forest with *Pentadesma butyracea* dominant appear to represent an earlier, more humid, climate and to be incompatible with the present arid climate.

182.4. Layer Communities

See No. 1133.

182.5. Synecological Measurements and Methods

See also Nos. 1865, 1873–4.

1377. HARTMANN, F. Grundsätzliches zur Standortskartierung nach forstökologischen Standortstypen. **[Basic conceptions for site mapping of 'forest-ecological' site types.]** *Schweiz. Z. Forstw.* 106 (5), 1955 (303–15). 10 refs. [G.f.]

Stresses the importance of determining, and indicating on vegetation maps, the direction in which ecological development is progressing, i.e. whether it is evolving towards the natural climax, is in regression, or is in some state of secondary evolution. [Cf. *For. Abstr.* 17 (No. 1865).]

187. Vegetation Types

See also Nos. 1121, 1155, 1160–2, 1299, 1410, 1412–3, 1862, 2314.

1378. SEIBERT, P. Die Wald- und Forstgesellschaften im Graf Görtzischen Forstbezirk Schlitz. **[The natural and artificial forest communities in the Schlitz forest range.]** *Angew. PflSoziol., Stolzenau* No. 9, 1954. pp. 63 + 2 maps. 34 refs. [G.g.]

Outlines the geology and soils, climate and forest history of this range, most of which lies on the middle bunter sandstone, with a note on ground vegetation as an indicator of site class [cf. *For. Abstr.* 17 (No. 704)]. Deals at greater length with the plant sociology of the natural forest communities and those replacing them in plantations, with brief notes on silvicultural matters, recognizing as the chief natural types the *Querceto petraeae-Betuletum, Luzulo-Fagetum, Melico-Fagetum* and *Querceto-Carpinetum.* An appendix briefly discusses the site requirements of Larch (for which the range is famous), and the effects of Larch plantations on the soil, concluding that in this region there is no reason to restrict its planting provided that an understorey of shadebearers, e.g. Beech or Hornbeam, is maintained. [Cf. *For. Abstr.* 15 (No. 2420).]

1379. HUFNAGL, H. Die Waldstufenkartierung in Oberösterreich. **[The mapping of altitudinal zones of forest in Upper Austria.]** *Zbl. ges. Forstw.* 73 (3), 1954 (132–48). [G.]

Describes the mapping procedure which distinguishes (*a*) a lower Beech zone, coinciding with the former wine-growing region, up to ca. 300–400 m. (upper limits, in particular, vary considerably according to topography and exposure) whose natural type is Oak/Hornbeam forest; (*b*) an intermediate Beech zone with optimum growth conditions for Beech and good ones for Silver Fir, forming the upper limit for Oak, up to 600–1000 m.; (*c*) an upper Beech zone, the home of the Fir/Beech/Spruce forest, where Spruce is the natural species, reaching up to 1200–1500 m.; and (*d*) a coniferous zone, with Spruce and Larch, and some *Pinus cembra* in its upper parts, which nowadays never extends up to the original timber line. Where natural forest cover no longer exists, reliance was placed on the ground vegetation, of which a list, showing the zones in which they occur, is given separately for the parts of the country S. and N. of the Danube.

1380. MATUSZKIEWICZ, A., and MATUSZKIEWICZ, W. Wstępna charakterystyka fitosocjologiczna lasu 'Ruda' w Puławach. **[Plant sociological investigations in the Ruda forest near Puławy.]** *Ekologia Polska, Warszawa* 2 (1), 1954 (5–22). 11 refs. [Pol.russ.f.] BL. U.

Among the associations distinguished, types of *Querceto-Betuletum* and a '*Querceto-Carpinetum medioeuropaeum*' are most extensive. The authors think there is a tendency towards the development of *Vaccinio-Piceeta* due to rapid podzolization, caused by bad forestry and a lowering of the water-table through riverain erosion.

1381. MATUSZKIEWICZ, A., and MATUSZKIEWICZ, W. Die Verbreitung der Waldassoziationen des Nationalparks von Białowieża. **[Distribution of forest associations in the Białowieża National Park.]** *Ekologia Polska, Warszawa* 2 (1), 1954 (33–57). 22 refs. [G.pol.russ.] BL.U.

About 45% of the area, which comprises over 4000 ha. of some of the most undisturbed forests of the Central European Plain, is classed as *Querceto-Carpinetum medioeuropaeum*, ca. 20% as *Querceto-Betuletum.* Conifer associations (with Spruce and Pine) compose ca. 8%. The other associations are mainly riverain or on very damp sites (swamps). All are described in detail, including the soil types and other site conditions.

1382. TALLÓS, P. A pápakovácsi láprét növénytársulásai és fásítása. **[Plant associations on the [fen] peatland meadow of Pápakovácsi.]** *Erdész. Kutatás., Budapest* 1954 (4), (55–69 + smries. in suppl.) 11 refs. [Hu.e.g.russ.]

A detailed floristic study, with specific suggestions for tree-planting experiments.

1383. CORONA, E. Aspetti dei consorzi a '*Larix decidua*' Mill. nel Trentino. **[Aspects of *Larix decidua* associations in the Trentino.]** *Monti e Boschi* 6 (10), 1955 (453–7). [It.]

Describes some characteristics of Larch stands in the Trentino, stressing the importance of the phenological types of the *Laricetum* flora, and expresses some doubts as to the stability of Larch in low- and medium-altitude Alpine sites with high atmospheric humidity.

1384. MOLINIER, R. La végétation méditerranéenne dans ses relations avec les conditions de climat et l'action humaine. **[Mediterranean vegetation in relation to climate and to human activity.]** *Bull. Soc. for. Franche-Comté* 28 (7), 1955 (331–45). [F.]

Briefly reviews the history and present state of Mediterranean vegetation, both natural and artificial.

1385. CUCCHI, C. C. I popolamenti vegetali della Foresta Umbra del Gargano. **[The vegetation types of the Forest of Umbra in the Gargano region of Apulia.]** *Delpinoa, Napoli* (*n.s.*) 2, 1949 (105–44 + 2 maps). [It.] L.S.

Comprises chapters on geology, climate, and plant associations on the forest, floristic comparison with the Dalmatian coastal region, comparison of the *Fagetum* of Umbra with other European *Fageta*, and notes on other tree species occurring in the forest.

1386. ARAÚJO, I. ALVES DE. Zonagem natural e exploração do solo no planalto da Lameira. **[Natural zones and soil studies in the Lameira plateau.]** *An. Inst. Agron., Lisboa* 19, 1952/53 (119–56 + 4 plates). [Port.]

Studies of the plants, fauna, and soils, of different vegetation types in this area, with recommendations, based on these data, for their use.

1387. SIRÉN, G. **The development of Spruce forest on raw humus sites in northern Finland and its ecology.** *Repr.* from *Acta for. fenn.* 62 (4), 1955. pp. 408. 465 refs. [E.fi.]

[Cf. *For. Abstr.* 14 (No. 1165).] This very comprehensive study, based on the author's own researches as well as the literature (465 refs.), is in two parts: (1) The development of Spruce forest on raw-humus sites in northern Finland [Cajander's HMT sites], and (2) The effect of the stands on microclimate and soil. In part 1, the author distinguishes two main types of stand, (*a*) primary, originating after fire, and (*b*) secondary, originating by natural regeneration from (*a*). Stand development (density, diameter distribution, height, volume distribution, mortality, and natural regeneration), development of associated vegetation, changes and development of root systems, and accumulation of raw humus, are described and discussed for both types. Birch plays an important part in the development of (*a*), diminishing as the stand ages; (*b*) stands are almost pure Spruce. The superiority of (*a*) over (*b*) in mean height, stand volume, and total production, is maintained throughout and the accumulation of raw humus is much greater under (*b*) than under (*a*). Part 2, largely based on the author's researches, deals with changes in illumination, temperature, wind velocity, snow melt, interception, and air humidity within the stand as it develops, and effects of stand development on soil moisture (with an investigation of transpiration by Birch and by Spruce), soil aeration, soil temperature, nutrient contents and acidity of soil, and development of CO_2. In all these respects, the relatively more beneficial influence of Birch was confirmed. The practical applications of these findings are discussed and it is concluded that the restoration of the northern Spruce forests to their primary condition can be most simply and quickly effected by clear felling, burning over, and artificial regeneration. The deciduous seedling stand that will develop naturally on the burnt-over areas should be left until the planted Pine or Spruce is thinned, and at thinning a slight admixture of deciduous trees should be retained wherever competitive conditions permit. It is recommended that, wherever possible raw-humus Spruce stands should be converted to Pine.

1388. RÜHL, A. Die forstlich-pflanzengeographischen Verhältnisse Estlands. **[The forest vegetation of Estonia.]** *Schweiz. Z. Forstw.* 106 (6/7), 1955 (337–56 + 4 photos). 21 refs. [G.f.]

Spruce is the commonest forest species, occupying 40% of the forest area, followed by Scots Pine (20%), Birch (20%), Aspen (10%).

1389. REMEZOV, N. P. Zavisimostj meždu počvennymi uslovijami mestoproizrastanija i tipami lesa na primere Mologo-Šeksninskogo polesjja. **[The relationship between soil conditions and forest types as exemplified by the wooded region between the rivers Mologa and Sheksna.]** *Počvoved.* 1955 (8), (26–37). 12 refs. [Russ.] [Moskovskiĭ ordena Lenina gosudarstvennyĭ Universitet.] A.P.B.

Discusses the correlation of soil types (with 3 tables giving the results of chemical analyses) and forest types (classified by Sukačev's system) in this region, and presents a tabular summary in which the forest types, their site class and soils, are graphed according to the two criteria—soil moisture and nutrient supply. The forests represented are various types of Scots Pine, Norway Spruce, Spruce/hardwoods, Birch/Alder and Alder.

1390. ERLANDSON, U. Bidrag till kännedom om heddegenerationen i övre Dalarnas tallskogar. **[A study of heath degeneration in the Pine forests of Upper Dalarna.]** *Svenska SkogsvFören. Tidskr.* 51 (3), 1953 (275–95). 32 refs. [Sw.sw.]

Data on ground vegetation, forest type, site quality, density, tree species, age, soil properties (especially degree of podzolization), and evidence of past fires for sample plots mainly in open Pine forest in the Havstjärnsheden, with some discussion of the significance of these data for reforestation.

1391. ZOHARY, D. **Ecological studies in the vegetation of the Near Eastern deserts. III. Vegetation map of the central and southern Negev.** *Palest. J. Bot. (J. Ser.)* 6 (1), 1953 (27–36). 10 refs.

Includes site conditions and location of steppe forest of *Pistacia atlantica*.

1392. SĀBETI, H. **[Phytosociological groups of Persia's northern forests.]** *Mon. Bull. Iran. For. Serv* 6 (5), 1955 (7–11). [Per.]

Discusses the difficulties in determining forest types in Persia, criticizes the accuracy and quality of the work done to date, and laments the destructive changes wrought by such abuses as firing and reckless felling. Some major types of interest round the Caspian are briefly described—*Quercetum*, *Querceto-Carpinetum*, *Parrotieto-Carpinetum* etc.

1393. **Plant ecology: Proceedings of the Montpellier symposium.** *Arid. Zone Programme, UNESCO Paris* No. 5, 1955. pp. 124 + 8 plates. [F.e.or E.f.]

The symposium was concerned with plant ecology in arid zones, and the proceedings are arranged in the sections: (1) structural and physiological features of vegetation, (2) climatic, ecoclimatic and hydrological effects on vegetation, (3) soil and vegetation, (4) other factors.

1394. DANSEREAU, P. **An analysis of the Canary Island Laurel forest.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (89). A.P.B.

A temperate rain forest, very widespread in the Tertiary, has persisted in the Azores, Madeira and the Canary Islands. A comparison of its present composition with fossil records as recent as the Upper Pliocene, suggests that it is somewhat specialized, possibly a segregate of a richer complex now extinct in Europe and Africa. The bioclimatic position of this formation in the Canaries, between an essentially African littoral-desert succulent-shrub zone and a heath-and-Pine zone, explains its contamination by elements of more recent origin. Comparisons are made with other temperate rain forest types.

1395. **Papers read at the second plenary meeting held at Oxford from September 29th to October 3rd 1953.** Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (387–585). 4 refs.

Contains 6 papers in French or English, with summaries in English, French or Italian, on the zonation and distribution of vegetation on African mountains with proposals for nomenclature of these zones and a general discussion on this subject. Other papers are separately abstracted.

1396. THOMAS, R. Des facteurs régissant, sous les tropiques, la répartition des formations forestières. **[Factors governing the distribution of forest formations under tropical conditions.]** *Bull. Inst. agron. Gembloux* 23 (3), 1955 (317–35). 19 refs. [F.] E.M.B.

Discusses climatic, biotic and faunistic factors, illustrated by reference to the Belgian Congo.

1397. MULLENDERS, W. **The phytogeographical elements and groups of the Kaniama district (High Lomami, Belgian Congo) and an analysis of the vegetation.** Association pour l'Étude taxonomique de la Flore d'Afrique Tropicale. *Repr.* from *Webbia, Firenze* 11, 1955 (497–517 + 2 sketchmaps). 15 refs. [E.f.it.]

Gives climatic data, phytogeographic analyses of the flora and vegetation in spectra and association tables, and the hygro- and xero-seres up to and regression down from the *Klainedoxa/Pterygota* climax on red alluvial soils and similar data for the *Mellera/Canarium* climax on granite soils.

1398. MOSS, E. H. **The vegetation of Alberta.** *Bot. Rev.* 21 (9), 1955 (493–567). 143 refs. [Univ. of Alberta, Edmonton.]

A review of literature, with main emphasis on synecological aspects and especially succession, dealing with the central and southern regions of the province, which are of particular interest as the meeting place of steppe (prairie) and forest formations, and of the boreal and Cordilleran floras. Brief notes are appended on some of the chief range, forest and catchment problems.

1399. MAYCOCK, P. F. **Phytosociology of a coniferous community in the Algonquin Park area, Ontario, Canada.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (77). A.P.B.

This community is situated in a broad ecotonal belt between the northern boreal and southern deciduous forests, but the boreal elements predominate. White Spruce, White Pine and Balsam Fir are the dominant tree species, and permit this type to be labelled *Picea/Pinus/Abies* association, although the community varies from place to place. Logging and burning seem responsible for the successional aspect and open-grown appearance. The present regeneration points to a long period of occupation by the existing dominants, and indicates possible invasion by hardwoods in the distant future. This type represents a stage in the natural cycle of White Pine succession as the northern edge of its range is approached in Canada.

1400. HUSTICH, I. **Forest-botanical notes from the Moose river area, Ontario, Canada.** *Acta Geographica, Helsinki* 13 (2), 1955. pp. 50. 48 refs. [E.]

Contains sections on general geography, the northern tree lines, tree and bush species in the area, the forests in the area, forest types, and tree growth.

1401. LYNCH, D. **Ecology of the Aspen groveland in Glacier County, Montana.** *Ecol. Monogr.* 25 (4), 1955 (321–44). 42 refs.

The Aspen groveland of Montana is a mosaic, in which groves of *Populus tremuloides* and *P. trichocarpa* var. *hastata* fill intermorainal depressions, while upper slopes and moraine summits are covered by grassland. The ecotone is stable, its stability being due to the inability of Aspen to produce seed in sufficient abundance, to establish groves in what appear to be suitable depressions, or to invade the grassland by suckering. The poor seed crops are probably the result of unfavourable weather, and the inability to invade grassland appears to be due to insufficient soil moisture. *From author's summary.*

1402. JONES, Q. **Shrub tundras and Black Spruce muskeg of interior Alaska.** *Abstr.* in *Bull. ecol. Soc. Amer.* 36 (3), 1955 (77). A.P.B.

The shrub tundras and Black Spruce muskeg of interior Alaska are discussed and compared as border-line cases with regard to the generally accepted concept of tundra.

1403. HOLLOWAY, J. T. **An ecological classification of the forest types of the Westland Podocarp region.** *N.Z. J. For.* 7 (1), 1954 (1955), (23–33).

A discussion based on the author's theory that the vegetation of this region is in an unstable condition owing to comparatively recent climatic changes. [Cf. *For. Abstr.* 16 (No. 1506).]

1404. CAMERON, R. J. **Mosaic or cyclical regeneration in North Island Podocarp forests.** (With a commentary by *J. T. Holloway.*) *N.Z. J. For.* 7 (1), 1954 (1955), (55–67). 5 refs.

Recently it has been shown that tropical rain-forest areas may possess a mosaic structure and a cyclical succession of dominants, and it is probable that similar patterns and processes exist in some north-temperate forests. New Zealand Podocarp forests are considered to be related to certain tropical montane rain-forest formations. It seems likely that the above concepts can be used to advantage in considering North Island mixed hardwood/Podocarp forests, and a tentative application of the ideas to an area of an association of this type in the Whirinaki river valley is described and discussed in this paper. This area appears to have a cyclic succession of dominants where Podocarps alternate with hardwoods on individual sites. The preponderance of mature Podocarps over hardwoods over quite large areas could be due to the present association being a 'first-rotation' crop. The various effects that could cause a cyclical succession are briefly discussed. Where extreme environmental conditions exist a monoclimax is usually found. The values of the concepts of mosaic structure and of cyclical regeneration within the forest are discussed and tentative suggestions for working mixed hardwood/Podocarp forests so as to ensure their perpetuation are described. *Author's summary.*

1405. HENRY, J. E. **The development of native vegetation on pumice country, and its relationship with exotic Pine forests.** *N.Z. J. For.* 7 (1), 1954 (1955), (79–82).

The heath associations that cover these volcanic soils are held to be a fire climax. The exclusion of fire and accumulation of humus in *Pinus radiata* plantations some 30 years ago have resulted in the establishment of a dense understorey of native broadleaved shrubs and tree ferns. It is suggested that in a second rotation, natural regeneration of Pine, if left to itself, would be overcome by this native vegetation, which would ultimately evolve in the direction of high forest dominated by such broadleaved species as *Weinmannia.*

1406. MOHAN, N. P., and PURI, G. S. **The Himalayan conifers. III. The succession of forest communities in Oak-Conifer forests of the Bashahr Himalayas.** *Indian For.* 81 (8–11), 1955 (465–87; 549–62; 646–52; 701–11). 5 refs.

[Cf. *For. Abstr.* 12 (No. 989); 13 (No. 29).] The succession of 29 forest communities in the Oak/conifer forests of the Bashahr Himalayas has been studied in detail. The floristic composition of the community was studied in quadrats. Both the physical and biological environment involved in the development and succession of various forest communities have been worked out. There are three main climatic climaxes in the area, viz., pure Oak communities of one or other of the following species: *Quercus semecarpifolia, Q. incana, Q. ilex. Q. dilatata* is a seral community in the *Q. incana* climax. It is doubtful if a mixed community of these two Oaks would be climax. The presence of conifers in the area is determined by the following factors:—(i) Nature of the geological slope: Oaks are almost always dominant on the scarp slope, whereas the dip slope bears mixed Oak/conifer or pure conifer communities. (ii) Nature of secondary deposits: Oak climax is predominant on sedentary soils or on stabilized scree deposits; on secondary deposits, several communities usually predominate. On newly laid alluvium, broadleaved deciduous species form communities, and on older alluvium conifers, with or without deciduous species, and Oaks may be present. On glacial moraines an *Abies webbiana* community, with or without broadleaved deciduous species is present. (iii) Biotic factor: Generally the effect of this is to destroy the Oak climaxes, bringing in the conifer communities. Numerous types of Blue Pine and sometimes Deodar communities occur on abandoned cultivation. Intense grazing and pasturing accompanied by fire bring into being a number of secondary scrub types. The final state of forest degradation by the biotic factor is seen in grassy meadows. Two main climatic zones have been recognized, one the zone of high monsoon rainfall (wet zone), the other the zone of low monsoon rainfall (dry zone). In each of these, forest communities on different types of rock and the variable effect on vegetation of aspect, slope, topography and geological structure in different types of rock formations have been separately studied. *From authors' summary.*

1407. KHAN, M. I.-u.-R. **Tropical thorn forest of West Pakistan.** *Pakistan J. For.* 5 (3), 1955 (161–71). 7 refs.

[A paper submitted to the 4th World Forestry Congress, 1954.] The tropical thorn forest of West Pakistan is very widely distributed in the Indus basin, lying roughly between 24° and 32° N. latitudes. The characteristic principal woody species of the thorn forest are *Prosopis spicigera, Salvadora oleoides, Capparis aphylla,* and *Tamarix articulata.* The site factors of the thorn forest are very severe. The highest maximum temperatures go above 120°F. and the seasonal monsoon rainfall, varying between 30 in. and < 5 in., is very low and erratic. With canal irrigation, a great proportion of the original thorn forest has been converted to cultivation and a small portion to irrigated forest plantations. Natural regeneration from seed scarcely occurs, and the woody species of the thorn forest reproduce themselves vegetatively by coppicing and root suckers. The thorn forest is liable to injury by drought, high temperatures, frost, biotic interference, and unfavourable soil conditions. Its outturn is as low as 10 cu. ft. stacked firewood/acre/year. The yield of the irrigated forest plantations, on the other hand, is at least 25 times as large. *From author's summary.*

2. SILVICULTURE

See also Nos. 1289, 1300–3, 1307–10, 2327.

1408. OLBERG, A., and RÖHRIG, E. Waldbauliche Untersuchungen über die Weisstanne im nördlichen und mittleren Westdeutschland. [**Silvicultural investigations on *Abies alba* in north and central Western Germany.**] *SchrReihe forstl. Fak. Univ. Göttingen* No. 12, 1955. pp. 103. 174 refs. [G.g.]

A survey of plantings of *A. alba* in Germany outside its natural habitat. History, silvicultural treatment, yield in pure and mixed stands, climatic and site requirements, pests and other dangers are discussed, and some North American Firs are also briefly mentioned. Of the 3600 ha. stocked with Fir of 20 years and over, only ca. 25% can be considered successful, the water regime of the site being the decisive factor. Firs have proved more dependent on fresh soils of good moisture-storage capacity in hilly regions, and on available groundwater in the lowlands, than in their natural habitat with its generally higher precipitation. Premature ageing and drying of crowns often occur on unsuitable sites, particularly with individuals in the lower crown classes, preventing the formation of even-aged multi-layered stands and increasing the susceptibility

to pests. Only *Dreyfusia nüsslini* has so far proved a serious danger, but susceptibility to deer damage in early years limits the use of the Fir in mixtures.

1409. **Special hardwood issue.** *For. Fmr.* 15 (1), 1955. pp. 33.

Contains a number of articles on the possible future use and management of the very large areas of piedmont and bottomland hardwoods in the mid-South of the U.S.A.

1410. PHILIPPIS, A. DE. I querceti a foglia caduca. **[The semi-evergreen Oak stands [of Italy].]** Instituto de Selvicoltura dell' Università di Firenze, Florence. 1955. pp. 25 + 8 photos. [It.] *Repr.* from *Atti del Congresso Nazionale di Selvicoltura, Firenze 1954*, 1955 (133–51).

Gives an account of the area, distribution, composition (mainly *Quercus ilex*, *Q. suber*, and *Q. cerris*) of these woodlands, mainly of coppice origin, with suggestions for their conversion and management.

1411. CHOWDHURY, M. R. **The silvicultural problems in the Sal [*Shorea robusta*] forests of Mymensingh Division [, E. Bengal].** *Pakistan J. For.* 5 (3), 1955 (172–7).

The forests, originally all in private ownership, are much broken up and interspersed with agricultural land, and have been over-cut or ruined by shifting cultivation. Some 40% is now in Government hands, and it is proposed that part should be managed as coppice on a 25-year rotation, and part clear-felled and regenerated by *taungya* plantings.

1412. TAN-KIM-HUON. Sylviculture de la forêt dense au Cambodge. **[Silviculture of Cambodian rain forest.]** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/69, 1955. pp. 12. [F.] Limited distribution.

Describes the forest types of Cambodia (rain forest, savanna, flood forest, Mangrove swamps) in general, and then gives a more detailed account of the rain forest, and its silvicultural treatment, including line planting in the forest, and planting of cleared areas.

1413. BARNARD, R. C. **Silviculture in the tropical rain forest of Western Nigeria compared with Malayan methods.** *Malay. Forester* 18 (4), 1955 (173–90). 12 refs.

Observations made on a study tour, including both natural and artificial regeneration methods.

1414. MCELVEY, P. J. **Some ideas on Tawa (*Beilschmiedia tawa*) management in Central North Island forests.** *N.Z. J. For.* 7 (1), 1954 (1955), (68–74). 3 refs.

Outlines the ecology and distribution of the species as established by the National Forest Survey, and discusses the subjects of research necessary for evolving a proper system of management: (1) the establishment of Eucalypts in mixture with Tawa; (2) growth studies; (3) in view of degrade of large logs through 'black heart', the determination of the diameter of log that will give the greatest financial return for the shortest possible rotation.

1415. ENSOR, E. E. **Forest management in the *Nothofagus* forests of Nelson-Westland.** *N.Z. J. For.* 7 (1), 1954 (1955), (50–4). 4 refs.

A brief account is given of the first steps in *Nothofagus* forest management and the difficulties in determining a silvicultural system that may be readily applied on a wide scale, making the best use of advance growth. Examples are given of the diversity of these forests.

1416. **Tropical silviculture.** Forestry Agency, Tokyo. [*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/53, 1955. pp. 7. 8 refs.

Notes by the Forestry Agency, Tokyo, on the silviculture in Japan of *Tectona grandis*, *Cinchona ledgeriana*, *Casuarina equisetifolia*, *Cryptomeria japonica* and *Acacia decurrens* var. *mollissima*.

22. Silvicultural Systems. Constitution and Composition of Stands; Forms of Stand

221. High Forest Systems

See also Nos. 1415, 1431, 1433, 1438, 1646, 1734.

1417. PENEV, N., VLASEV, V., DOBRINOV, I., GEORGIEV, A., and NAUMOV, Z. Analiz na dosegašnija opit po prilagane na golite seči v njakoi tipove gora na Čepelarskoto DGS i UOGS 'G. St. Avramov'. **[Analysis of accumulated experience in the use of clear felling in some forest types of the Čepelare state forest and G. St. Avramov experimental forest.]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (53–126). 28 refs. [Bulg.bulg.russ.]

The forest types investigated belong to two basic groups: (*a*) moist and fresh Spruce/Pine/Fir, or Spruce/Fir stands on loamy sands of medium depth and relatively rich brown forest soils (N. aspect, slope 10–30°), and (*b*) dry Pine type on fine brown forest soils. The studies were made on 93 felling sites, 30–140 m. wide. It was concluded that: (1) in (*a*), 80–100 m. is the maximum width of clear felling, if satisfactory regeneration is to be assured from the adjacent forest edge; (2) on N. slopes regeneration is more abundant to the W. side than the E., when felling areas run N. and S., and more abundant in the S. than in the N. when they run E. and W.; (3) the composition of the mixed Spruce/Fir stands on fresh soils of medium depth is best maintained and controlled by clear fellings; (4) in moist forest types, clear fellings considerably improve soil quality (humus, structure, pH); (5) in (*a*) slash burning resulted in Spruce and Pine regeneration 2–6 times as abundant as when slash was merely piled in heaps; soil working also increased the amount of regeneration.

1418. ASSMANN, E. Naturgemässer Wirtschaftswald und Zuwachsleistung. **[Quasi-natural production forests and their increment performance.]** *Forst- u. Holzw.* 9 (21; 22), 1954 (439–41; 461–3). 9 refs. [G.]

A critical discussion of the claims made by the 'nature' school for the selection forest, and of the theoretical assumptions underlying them. In this context the author questions the justification of

limiting the size of unavoidable even-aged units to a '*horst*' and incidentally proposes to standardize such units, e.g. a '*horst*' to mean a patch of 0·1–0·5 ha. etc. To facilitate comparisons, he uses the concept of mean felling age in place of that of rotation.

1419. DANNECKER, K. Laubwaldbewirtschaftung im Sinne der Plenteridee: ein Beispiel aus der Praxis. **[The management of broadleaved forest on the selection system: a practical example.]** *Schweiz. Z. Forstw.* 106 (5), 1955 (291–302). 12 refs. [G.f.]

After discussing the advantages of the selection system for managing mixed broadleaved forest, gives figures of growing stock and yield for such a forest in the Swabian Alps.

222. Coppice, Pollarding and Lopping Systems

See also No. 1633.

1420. VENET, J. Expériences relatives à l'exploitation des taillis. **[Experiments in the exploitation of coppice.]** *Rev. for. franç.* 7 (11), 1955 (771–84 + 4 photos). [F.]

Outlines the studies being made by the Forest Research Station at Nancy in conjunction with the Centre Technique du Bois at Paris, and gives some preliminary results of time studies on preliminary cleanings, comparative times of felling and cross-cutting with hand and power (reciprocating, circular and chain) saws, effect of diameter, number of stems per stool, and species, on felling time and time taken in primary conversion.

1421. EDLIN, H. L. **Coppice-with-standards and the Oak tanning bark trade in the Scottish highlands.** *Scot. For.* 9 (4), 1955 (145–8). 11 refs.

An account of this trade, which was very profitable until competition from foreign extracts caused its decline at the end of the 19th century. Existing areas of scrub Oak probably represent the outcome of some 3 centuries of regular cutting followed by half a century of neglect, and its use as an indicator of site quality needs great caution.

226. Changes of Silvicultural System. Conversion (by System or Species)

See also No. 1439.

1422. MÜLLER, M., and VOGEL, O. Zur Frage der Bestandesumwandlung. **[The conversion of [pure to mixed] stands.]** *Schweiz. Z. Forstw.* 106 (4), 1955 (222–30 + 1 photo). [G.f.]

Gives a brief account, with some costs, of projects for the conversion of some 4500 ha. of poor coniferous forest to mixed uneven-aged forest, by introducing groups of broadleaved species. Fencing against game accounted for 19% of total costs. The fact that Spruce is almost the only forest species immune to game damage often acts in its favour.

228. Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand

See also Nos. 1126, 1550, 1552, 1809, 1861–3.

1423. PROĆKO, P. Biologiczne wlasności modrzewia i technika jego hodowli. **[Biological properties of Larch and the technique of growing it.]** *Las polski* [*Warszawa*] 29 (3), 1955 (35–6). [Pol.] From *abstr.* in *Prehl. lesn. lit.* 6 (8), 1955 (No. 2920). [Cz.] P.R.

In mixed and multi-storeyed stands [in Poland?] Larch should constitute an upper, open storey, with ⅓ of the crown exposed to full light. The second storey should be Lime, Spruce, Silver Fir, Beech and Hornbeam, the proportion of Larch not exceeding 25%.

23. Regeneration and Formation of Stands

See also Nos. 1309, 1387.

1424. PATRONE, G. Rinnovazione naturale e rinnovazione artificiale. **[Natural *vs.* artificial regeneration.]** *Ital. for. mont.* 10 (2), 1955 (85–9). [It.it.f.]

Argues that the length of time often needed to obtain natural regeneration in Italian forests makes artificial regeneration superior economically, and sets out to prove this thesis by comparing the costs and returns from two woods treated in the two ways—i.e. clear felling and planting in the one case, and progressive regeneration fellings in the other, but taking into consideration the negative return of the latter during the period of establishment.

1425. CRISTOFOLINI, F. Rinnovazione naturale e rinnovazione artificiale nelle fustaie alpine. **[Natural *vs.* artificial regeneration in alpine forest stands.]** *Ital. for. mont.* 10 (2), 1955 (240–4). [It.]

Criticizes Patrone's arguments in favour of clear felling and artificial regeneration as being doubtfully valid in any case, and particularly dangerous in alpine forests, where the protective function of the forest is of the first importance. With a reply by Patrone. [Cf. preceding abstract.]

1426. FRÖHLICH, J. Zur Frage der Eichennachzucht. **[The problem of Oak regeneration [in Austria].]** *Zbl. ges. Forst- u. Holzw.* 72 (2/3), 1954 (116–20). [G.]

Chiefly an account of the virtual destruction, towards the end of the 19th century, of the mixed Oak forests in Transylvania. The natural regeneration that followed seeding fellings, and was freed by clear felling 5 years later, had become suppressed by the competition of other species, and millions of 2-year-old seedlings planted out on the felling sites suffered the same fate or became low-grade, branchy trees. Successful conversion of old Beech stands into Oak in the Slovenian hills near Viorvitica is also described. The author concludes from these examples that Oak is best regenerated by sowing in drills 70 to 80 cm. apart. Only a few first-class sites in the hills of Lower Austria and the Burgenland are considered suitable, and these should be used for Oak with an admixture of Beech.

1427. CARRAPIETT, J. B. **Regeneration of Teak in Burma.** *Burmese For.* 5 (1), 1955 (48–57). [E.]

Describes the methods of regeneration used: (1) the old (pre-1918) plantations in gaps in the forest, (2) the regular plantations made since 1918 (both of these established by *taungya*), and (3) natural

regeneration obtained by girdling and climber cutting.

231. Natural Regeneration

See also Nos. 1301, 1356, 1404–5, 1415, 1417, 1424–7, 1627, 1885.

1428. HOLT, L. **White Spruce seedbeds as related to natural regeneration.** Pulp and Paper Research Institute of Canada, Montreal. 1955. pp. 28 + iv. 41 refs.

A digest of the published literature on *Picea glauca*, quoting 41 items treating of the factors affecting seed germination and seedling survival.

1429. CROSSLEY, D. I. **Survival of White Spruce regeneration resulting from various methods of forest soil scarification.** *Tech. Note For. Br. Can.* No. 10, 1955. pp. 9. 3 refs.

Additional data have now been collected on this project [see *For. Abstr.* 14 (Nos. 2106–7)], and substantially confirm previous findings. All forms of scarification give better results than untreated controls. A heavy seed crop is necessary to give adequate stocking, owing to loss to rodents, birds etc., and it is suggested that the poorer the seed year the more intensive must be the soil treatment.

1430. OLSON, C. E., JR., and BAY, R. R. **Reproduction of upland cutover Spruce-Balsam-hardwood stands in Minnesota.** *J. For.* 53 (11), 1955 (833–5). 3 refs. (*Scientific Journal Series Paper, University of Minnesota Agricultural Experiment Station* No. 3234.)

A more extended and detailed account of the studies noticed in *For. Abstr.* 16 (No. 341).

1431. HEBB, E. A. **Seedfall and cutting systems in Texas Shortleaf [*Pinus echinata*] stands.** *J. For.* 53 (11), 1955 (846–7). [Southern Forest Experiment Station, New Orleans.]

In the good seed year of 1907, a study in east Texas indicated important variations in seed production from Shortleaf Pine stands subjected to various types of regeneration felling. When cut in the winter of 1949–50 the stands were essentially even-aged and about 55 years old. The systems of felling employed were: (*a*) single-tree selection, (*b*) 30-tree shelterwood, (*c*) clear-felling in strips 1·67–2·08 chains wide. There were large differences between methods, (*c*), where seed came in from adjacent stands, giving much the lowest catch of seeds (average ca. 500,000/acre). The catch under (*a*) averaged 1,120,000/acre, and that under (*b*) 2,000,000/acre. Apparently method (*a*) either gave insufficient release to stimulate as much seed production as (*b*), or else it resulted in cutting some of the best seed trees.

1432. HARRINGTON, T. A., and STEPHENSON, G. K. **Repeat burns reduce small stems in Texas Big Thicket.** *J. For.* 53 (11), 1955 (847). [Southern Forest Experiment Station, New Orleans.]

Of 4 pairs of 80-acre plots, (*a*) was burned once, in spring 1948, (*b*) twice, in the spring of 1948 and 1951, (*c*) three times, in the spring of 1948, 1951, and 1952, and (*d*) was left unburned. The stands had a sparse overstorey of Loblolly and Shortleaf Pine, beneath which small hardwoods, shrubs, and climbers precluded Pine regeneration. Burns were carried out carefully and damage to merchantable trees was negligible. The linear correlation between total number of 1-, 2-, and 3-in. stems (Y) and the number of fires (X) is highly significant and can be expressed as $Y = 2778 - 731\,X$.

1433. WALKER, L. C., and DAVIS, V. B. **Forest walls retard young Longleaf.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 93, 1954 (3).

In a study in S. Alabama, seedling growth was retarded up to a distance of 55 ft.—further than the spread of the crowns—from the border of mother stands. Root collars at 5 years averaged 0·33 in. in diam. near the border, increasing 0·1 in. for each 10 ft. away. Survival % at 5 years was 51 close to the border against 78 at 40 ft. Trees 11 in. in d.b.h. had a stronger competitive influence than smaller trees.

1434. WENGER, K. F. **Growth and prospective development of hardwoods and Loblolly Pine seedlings on clearcut areas.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 55, 1955. pp. 19. 5 refs.

The area occupied by new hardwood growth 5 years after clear felling was greater on burnt than on unburnt sites where the soil was well drained, but less on poorly drained, plastic soils. Height growth showed no clear difference. Loblolly seedlings responded well to release, particularly if treatment included poisoning of the competing vegetation as well as cutting or girdling. In some areas vigorous growth was resumed after the seedlings had fallen over because of sudden lateral exposure. Released trees had a lower mortality rate from insects and other causes, than overtopped trees, but were more often attacked by *Rhyacionia frustrana* (though without serious ill effects). Various criteria are suggested to determine seedlings likely to respond to release and become dominants, e.g. previous growth, certain minimum heights, and the position of the leading shoot in relation to the competing hardwoods at 3 years. A total of 400–900 well distributed seedlings per acre are considered adequate according to site, provided they are, or can be made, free to grow.

1435. GARMAN, E. H. **Regeneration problems and their silvicultural significance in the coastal forests of British Columbia.** *Tech. Publ. B.C. For. Serv.* No. T.41, 1955. pp. 67. 40 refs. Price 25 cents.

Extensive studies of regeneration in logged Douglas Fir stands in British Columbia showed that the common failure to stock adequately after commercial exploitation is due to a combination of factors—lack of an adequate seed source, uncontrolled slash fires which destroy seed as well as injuring the seedbed, destruction of seed by insects and rodents, and lack of shade. It is laid down that cutting practices designed to ensure natural regeneration of the Douglas Fir type must: (1) provide for an adequate seed source by reservation of blocks or strips of seed trees adjacent to clear-felled areas, or by leaving seed trees uniformly scattered over the felling area; (2) ensure a satisfactory seedbed by regulated slash-burning in spring or summer of a

good seed year on north slopes, and protecting from fire the south slopes where shade of slash or live cover is essential for regeneration; and (3) protect seed in the soil from rodents, by poisoning and trapping.

1436. SLOW, L. J. **Douglas Fir regeneration on the Kaingaroa Plains, Rotorua Conservancy.** *N.Z. J. For.* 7 (1), 1954 (1955), (83–9). 1 ref.

Investigations into the seeding habits of Douglas Fir at Kaingaroa are described. Viable seed is first produced at 18 years, or 40 feet in height, but there is no regular coning cycle. The distance from a seed tree up to 80 feet high at which regeneration equivalent to 6 × 6 ft. stocking may be expected has been determined. Suggestions are made for future regeneration fellings and an example is given of the extent of *Navomorpha lineatum* damage in second growth. *Author's summary.*

1437. HUNZIKER, T. Observations sur le rajeunissement naturel du pin d'Alep dans la région de Fontfroide, au nord de Montpellier. **[Natural regeneration of *Pinus halepensis* in the Fontfroide district, north of Montpellier.]** *Schweiz. Z. Forstw.* 106 (1), 1955 (59–64). 6 refs. [F.g.]

Natural regeneration of *P. halepensis* in Languedoc depends in the first place upon the presence of a marly subsoil and then upon the special ecological conditions of the associations and sub-associations, and the degree of crown closure.

1438. BORCHERS. Zur Technik der Buchenverjüngung in Niedersachsen. **[On the technique of [natural] regeneration of Beech in Lower Saxony.]** *Forst- u. Holzw.* 9 (20), 1954 (416–21). 19 refs. [G.]

On the basis of literature and local experience, the author deals with the various factors, such as weather and climate, site conditions and silvicultural treatment, influencing the occurrence and abundance of Beech masts, and the development of natural regeneration of Beech and of mixtures of Beech with other species, in the region. He describes experiments in Brunswick with a type of wedge (shelterwood) regeneration system adopted in the '20s, and the reasons for its partial failure (e.g. old, little thinned stands suffering from disturbance, canopy interference, or lateral exposure, adoption of small regeneration areas with insufficient regard to the infrequent occurrence of good mast years).

1439. REINHARDT. Buchennaturverjüngung auf kalkarmen Gebirgsböden. **[Natural regeneration of Beech on lime-deficient mountain soils.]** *Forst- u. Holzw.* 9 (21), 1954 (445). [G.]

Describes an over-mature, 200-year-old Beech stand, parts of which had been scheduled for conversion to Spruce, since it was considered to be impossible to regenerate it by orthodox methods. A drastic opening of the canopy, leaving trees spaced 9–12 m. apart, resulted in plentiful Beech regeneration. Some clearing of brambles may be necessary, and final cuttings will have to be done carefully.

1440. SAHAY, B. K. **The problem of Sal (*Shorea robusta* Gaert.) regeneration in A3 dry peninsular Sal forests of Bihar.** *Indian For.* 81 (11), 1955 (668–76). 36 refs.

Compaction of the topsoil is one of the principal enemies to Sal regeneration in these forests. Hoeing and cultivation are recommended as immediate remedies, with fire exclusion, regulation of grazing, and prevention of soil exposure as long-term measures to prevent the desiccation of Sal seed. Competition for moisture at the peak of the growing season is the factor chiefly responsible for the dying back of seedlings in the pre-monsoon period. Drastic felling of the overstorey as well as the understorey, in one stage, followed by annual cutting of the undergrowth for a number of years just before the growing season, is suggested for the establishment of whippy Sal seedlings.

1441. KOSTKA, K. Příprava půdy zpopelněním půdního povrchu. **[Preparation of the soil by ashing the ground cover.]** *Lesn. Práce* 34 (8), 1955 (372–4). [Cz.]

Recommends, as a measure for initiating natural regeneration on clear cut areas, the elimination of weeds by burning, using a flame thrower in conjunction with an open-ended steel cylinder 60 cm. high and 60 cm. in diam., into which the flame is directed.

232. Artificial Regeneration

232.1. Choice and Trial of Species, Races etc.

See also Nos. 1126, 1177, 1289, 1583, 1591–2, 1594.

1442. STRAND, L. **Plot sizes in field trials.** *Z. Forstgenet.* 4 (6), 1955 (157–62). 9 refs. [E.e.g.f.]

There is a pronounced linear regression between b.a. and b.a. increment on small plots (5 × 5 m.), which is not found on larger areas. Analysis of data from yield plots for Norway Spruce has shown a negative intraclass correlation to exist between b.a. increment on adjacent 5 × 5 m. plots, and, in many cases also on 10 × 10 m. plots. In comparative trials where isolation strips are not needed, the most efficient use of the area is obtained with plots of ca. 200 sq. m. in natural stands, and somewhat less in plantations. In comparative trials in which isolation strips are used, the net area of the plots must be somewhat increased if the total area is to be used to greatest effect. As the width of the isolation strip is increased, the net area of the plot should also be increased. *From author's summary.*

1443. HARTMANN, F. K. Möglichkeiten der Leistungssteigerung bei unseren Gebirgswaldgesellschaften durch Anbau nord-amerikanischer Holzarten. **[Possibilities of increasing the yield of mountain forest communities in Germany by the introduction of N. American species.]** *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/54*) No. 58, [1955?] (100–26). 39 refs. [G.]

An expanded lecture, reviewing the climates of N. America and Germany, and suggesting species for trial on (1) sites poor in species and yield owing chiefly to adverse climates, poorness of soil, or extremes in the water regime (wet soils, dry soils, dry climates), and (2) sites richer in species and with better yield, but capable of still higher yields with a

suitable admixture of N. American species. Concluding remarks stress the need for considering provenance, 'plus trees' as seed sources, adequate areas for trials, tending, and protection—all matters that have often been neglected in former trials in Germany. Climatic data and species suggested for various sites are tabulated, and maps are appended giving Thornthwaite's climatic classification of N. America and the natural ranges of 20 species of probable interest for Germany.

1444. SCHWARZ, H. Die forstliche Bedeutung des Götterbaums für Österreich. [**The importance of *Ailanthus altissima* for Austrian forestry.**] *Öst. Vjschr. Forstw.* 96 (3), 1955 (133–41). 19 refs. [G.g.]

Discusses the climatic and site requirements of this species, which has been recommended for large-scale planting for pulpwood on poor dry sites, and concludes that, though it easily establishes itself on barren land, its later development on shallow or stony sites is often less favourable than that of other species, e.g. Poplars or Robinia. Experience in Germany and other European countries suggests that its poor frost-hardiness is a limiting factor. Its planting in mixtures with Ash, Lime, Elm and Oak on well protected sites, its use in shelterbelts, and, because of its resistance to smoke and dust, along roads and railways, should, however, be considered.

1445. PÁLL, M. Karoljuk fel a szelídgesztenyét. [**Let us encourage the Sweet Chestnut.**] *Erdö* 3 (8), 1954 (292–5). [Hu.]

A plea is made for a greater interest in *Castanea sativa*, which may attain, as in Austria, 22–25 m. in height and 50–60 cm. in d.b.h. in about 50 years. It has the same climatic requirements as Oak and prefers deep, medium-textured soils developed on weathered volanic rocks. Owing to its moderate light requirement the tree is eminently suited for undersowing poor stands of Oak or Scots Pine. One-year seedlings about 25–30 cm. high are best for purposes other than the regeneration of deteriorated stands.

1446. MARTÍN BOLAÑOS, M. Eucaliptos de mayor interés para España. [**Eucalypts of major interest for Spain.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 26 (74), 1955. pp. 95. [Span.]

A selection was made of 55 species of Eucalypt known to grow in Australia in conditions that can be paralleled in Spain, and data from Australian sources are presented on the trees, their silvicultural requirements, and their uses.

1447. LACOURLY, G. L'avenir des *Eucalyptus* en Tunisie. [**The future of Eucalypts in Tunisia.**] *Chêne-Liège* No. 1519, 1955 (27–37). [F.]

Suggests species suitable for different soils, aspects etc. in Tunisia.

232.11. Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.

See also Nos. 1302, 1408.

1448. JØRGENSEN, M. B. Træer på Grønland. [**Trees in Greenland.**] *Horticultura, København* 9 (2), 1955 (25–30). [Dan.] E.M.B.

A brief account, in the form of an interview with C. A. Jørgensen, of conditions in Greenland and of an attempt in 1953 to establish plantations and nurseries of *Abies sibirica, Larix sibirica, Picea abies, P. glauca, P. sitchensis, P. engelmannii, P. mariana, Pinus sylvestris, Betula neoalaskana* and *Populus tremula* × *P. tremuloides*, using 2 + 2 plants shipped from Denmark.

1449. WOOD, R. F., and NIMMO, M. **Trials of species in Thetford Chase forest.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (106–14). 10 refs.

Spring frost and drought are the main limiting factors in the choice of species for pioneer planting. Scots, Corsican, Lodgepole, and Ponderosa Pines, Douglas Fir and Japanese and European Larches all had some success. A number of frost-tender species failed outright, and no broadleaved species succeeded in the first instance, though some show some promise when introduced into pioneer crops of conifers.

1450. SCHENCK, C. A. [Editor]. Ergebnisse der II. Inventur ausländischer Holzarten durch die Deutsche Dendrologische Gesellschaft. [**Results of the 2nd inventory of exotic tree species by the D.D.G.**] *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/54*) No. 58, [1955?] (15–70). [G.]

[Cf. *For. Abstr.* 14 (No. 2115).] Results are here given for *Sequoia gigantea, S. sempervirens, Abies concolor, A. c.* var. *lowiana, Chamaecyparis lawsoniana, C. nootkatensis, Cryptomeria japonica, Libocedrus decurrens, Picea omorika, Pinus jeffreyi, P. peuce* and *Taxodium distichum.*

1451. RANNERT, H. Einiges über die Schaftform und Massenleistung von *Sequoia gigantea* Decn. [**On the stem form and volume of *S. gigantea.***] *Zbl. ges. Forstw.* 74 (1), 1955 (19–26). 6 refs. [G.g.]

A study based on 16 stems, a remnant of a stand established in 1880 together with Scots Pine on a 'class III' site near Göttweig, Lower Austria (dry sandy loam, medium to deep, on granulite, at 380 m. alt., with exceptional precipitation of 572 mm. and a mean annual temperature of 8·7° C.). Of the trees extant in 1920, 757 were later killed by the exceptional frost of 1928–29. Heights varied from 19 to 28 m., and d.b.h. from 45 to 87 cm. The mean stem volume was 3289 cu.m. including bark, which formed up to 18% of the total. The stems showed considerable taper. Mean d.b.h. was ca. 37 cm., mean height ca. 6 m. more than, and mean volume ca. 6 times as great as, those of the even-aged Pines on the site. Chiefly on account of frost danger, however, the author is against the indiscriminate introduction of *S. gigantea* into Austria.

1452. FABRICIUS, W. Messungsergebnisse an *Tsuga heterophylla* im Wald. [**Measurements of *T. heterophylla* in the forest.**] *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/54*) No. 58, [1955?] (153–4). [G.]

Brief account of: (1) Two underplantings (1932/33) in Scots Pine at Westerstede, Oldenburg. (2) A group of 30 trees, 40 years old, in the Weinheim municipal forest. (3) A 12-acre plot in the Diez forest, on the Lahn, which has a mean tree of 38·8 cm. d.b.h. and 30·5 m. height, b.a. 63·88 sq. m./ha.,

and volume 922 cu.m./ha. This last is said to be the finest stand of *T. heterophylla* in W. Germany.

1453. WAUTHOZ, V. Épicéa et sapin argenté en Moyenne Ardenne. **[Spruce and Silver Fir in the Central Ardennes.]** *Bull. Soc. for. Belg.* 62 (10), 1955 (442–4). [F.]

Measurements of sample plots in a former Pine stand into which Norway Spruce and Silver Fir had been introduced, were all in favour of the Fir, which, after a slow start, had everywhere outgrown the Spruce and was regenerating naturally. Its litter, unlike that of Spruce, decomposes rapidly and forms a black soil rich in earthworms.

1454. GEELHAND, G. Le pin de l'Himalaya (*P. griffithi* McClell., *P. excelsa* Wall., *P. nepalensis* De Chamb.). **[*Pinus excelsa.*]** *Bull. Soc. for. Belg.* 62 (10), 1955 (444–6). [F.]

Describes a small plantation of *P. strobus*, *P. excelsa* and *Larix decidua* near Malines, Belgium. *P. excelsa* at 35–40 years averaged 1·16 m. in girth, *P. strobus* 0·9 m., and *L. decidua* 0·8 m. *P. excelsa* appears to be immune, or at least strongly resistant to *Cronartium ribicola*, and the possibility of crossing it with *P. strobus* is suggested.

1455. GRAVATT, G. F., and GRAVES, A. H. **Experience with European Chestnuts [*Castanea sativa*] in the United States.** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/15-B.* 1955. pp. 3. Limited distribution.

1456. **[*Casuarina* trials in Cyprus.]** *Rep. For. Dep. Cyprus 1954*, 1955 (62).

The following conclusions were reached on the basis of 9 trials, laid out in the lowland forests and in the eastern part of the Northern Range. For the species employed (*Casuarina glauca*, *C. equisetifolia*, *C. cunninghamiana*, and *C. torulosa*), patch cultivation cannot be considered a suitable method of site treatment, and complete cultivation is probably essential. *C. torulosa* is definitely unsuited to conditions in Cyprus under the techniques employed in these trials (either patch cultivation or complete tractor cultivation). With complete cultivation on good quality sites, *C. cunninghamiana* and possibly *C. glauca* may prove satisfactory, if a fairly high % of beating up is accepted.

232.12. Races and Provenance Trials

See also Nos. 1234, 1241, 1299, 1301.

1457. EDWARDS, M. V. **Norway Spruce provenance experiments.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (114–26 + 6 photos).

Summarizes data from several small-scale trials in Scotland, Northumberland, and Kent.

1458. CHRISTIE, J. M. **Douglas Fir sample plots at Tortworth, Gloucestershire.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (127–35 + 3 photos). 3 refs.

Study of two crops on adjacent sites indicates the effect of site factors and possibly provenance, on the growth of a species. A good strain of Douglas Fir on a good site shows an m.a.i. of 100 Hoppus ft./acre at 80 years, while a neighbouring plot shows poor growth and form and coarse branching.

1459. STOECKELER, J. H. **European Larch seed sources compete successfully with Tamarack during 5-year test in northeastern Wisconsin.** *Tech. Note Lake St. For. Exp. Sta.* No. 440, 1955. pp. 2.

In a small-scale trial, *Larix decidua* from Silesia (altitude not known), the German Alps (2300–3300 ft.) and Czechoslovakia (1150–1350 ft.) compared favourably with *L. laricina* from Michigan in survival and growth. Survival of *L. decidua* from the Austrian Alps (2000 to 3900 ft.) and the Italian Alps (3300–4300 ft.) dropped sharply between the 3rd and 5th years. A sample of *L. sibirica* from Finland showed good survival but its growth was comparatively slow.

1460. PAULEY, S. S., SPURR, S. H., and WHITMORE, F. W. **Seed source trials of Eastern White Pine.** *For. Sci.* 1 (3), 1955 (244–56). 10 refs.

Statistically arranged tests of the first two years' nursery growth of 159 collections of *Pinus strobus* and of 13 years' field growth of 42 of these, showed that seed weight was the most important factor affecting the size of 1-year seedlings and was still a factor to be allowed for in 2-year seedlings, but had (from limited evidence) no residual influence at 8 years [cf. Spurr, *For. Abstr.* 6 (p. 220)]. Most of the collections were from open-pollinated trees and some showed significantly different growth rates but no correlation with local diversity of site. No distinct ecotypes based on growth rates were discernible either among the local (Massachusetts) collection or among those from New Hampshire, New York, Ontario, Michigan, Minnesota and Virginia. In fact, the best growth was from the local seed and growth rate decreased (in the order named) with increasing distance of the source from the place of test. Limited tests indicated that there were growth differences between sources, independent of soil fertility. In testing for the latter, 2-year seedlings showed much greater response than 1-year, indicating that these Pines should be grown for at least 2 years in nutrition tests. Controlled pollination should yield progenies of increased vigour, but a weevil-resistant strain or adequate weevil-control must first be developed.

1461. ZOBEL, B. J., and GODDARD, R. E. **Preliminary results on tests of drought hardy strains of Loblolly Pine (*Pinus taeda* L.).** *Res. Note Tex. For. Serv.* No. 14, 1955. pp. 23. 13 refs.

Provenance trials show consistently better survival in plants from seed of drier provenances (e.g. 95% survival from the extreme west of Texas compared with 8% from Florida), and little or no difference in growth rate.

232.13. Trials of Hybrids and Other Products of Tree Breeding

See also section 165.

1462. JOHNSSON, H. Hybridaspens ungdomsutveckling och ett försök till framtidsprognos. **[The early development of hybrid Aspen and an attempt to**

predict its further growth.] *Svenska SkogsvFören. Tidskr.* 51 (1), 1953 (73–96). 11 refs. [Sw.]

A number of investigations were made in plantations at Ekebo and Mykinge into the early development (up to about 8 years) of hybrid Aspens (*P. tremula* × *P. tremuloides*) in comparison with native *P. tremula* and, in one experiment, with *P. tremuloides*. The hybrids were very much superior in height and volume increment to any diploid and triploid strain of *P. tremula*, but *P. tremuloides* showed better growth than all but the best of the hybrids. An important factor in this superiority is probably the fact that both the hybrid and *P. tremuloides* are resistant to *Fusicladium radiosum* and *Melampsora* sp., which attack the leaves of the native Aspen and reduce the growth rate especially of young trees. In some experiments the diploid, and in others the triploid hybrids appeared to give better results. Growth of the hybrids was better on a cultivated soil, at a spacing of 50 × 50 cm., than on an undisturbed forest soil, at 1·2 × 1·2 m., but the reverse was true of the native Aspen. On the basis of these measurements and of comparisons with data for one of the best strains of native Aspen, tentative predictions are made in graphs and tables of the later development of the hybrid. It is estimated that an average yield throughout the rotation of ca. 15 cu.m./ha. yearly may be expected on the good Aspen sites in S. and central Sweden, that is, about double that of the native Aspen. Its economic rotation is expected to be about 35 years as against 60 years for the native Aspen.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 1427, 1524, 1539, 1581, 1620, 1715–8, 1791.

1463. HARRINGTON, T. A. **2,4,5-T basal spray on hardwoods does not harm Loblolly planted next day.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 95, 1955 (2).

Loblolly so planted did as well as seedlings put in 4 months later, and better than those on control plots where the hardwoods were cut back, with or without stump poisoning, probably because of the protection afforded by the dying hardwoods.

1464. **Russian scrub-clearing machinery.** *For. Equipm. Note, FAO* No. *B.*5.55, 1955. pp. 2.

Four units work together in a planned cycle to remove scrub and small trees and clear land for ploughing. They are: (1) a scrub-cutting machine, (2) an uprooting and collecting machine, (3) a ground-loosening machine, and (4) a machine for loading the collected scrub on lorries. Only the last was specially designed for the purposes, the others having been originally designed for forest road work.

1465. HAGSTRÖM, B., and MAGNUSSON, W. Prestationer och kostnader vid maskinell markberedning. [**Rates and costs in mechanical soil cultivation.**] *Svenska SkogsvFören. Tidskr.* 50 (4), 1952 (380–90). [Sw.]

Describes crews, organization of work, equipment, and areas cultivated in an investigation by the Svenska Cellulosa Aktiebolag in 1951, using Imset soil cultivators, 7 Cletrac HG 42 tractors showing different degrees of wear, or fresh from the factory, and one MAN tractor. Results are shown in graphs and tables. (1) Although results showed a wide scatter, there was a clear relationship for both makes of tractor between degree of difficulty of the soil cultivated and time per ha. The MAN tractor gave poor results on all but the lightest soils. (2) Costs per effective working hour were related to condition of the tractor and skill of the driver in actual driving and in repairs. Costs were distributed as follows: driver's wages 34%, loader's wages (for unloading the equipment from a sledge drawn by the tractor) 17%, repairs 21%, petrol and oil 6%, moving between the tracts to be cultivated 6%, amortization 16%. (3) Costs per ha. with adjustments to conditions of average difficulty ranged from Kr.62·27 to Kr.118·69. (4) Time spent and costs remained fairly constant for areas of 10–12 ha. and over, but for smaller areas rose sharply with decreasing size.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. Seed

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 1344, 1348, 1352–3, 1481, 1523.

1466. JAROŠ, P., and KASALICKY, E. Některá data o borovici a modřínu z úrody 1953/54. [**Some figures on the 1953–54 harvest of Pine and Larch [cones].**] *Lesn. Práce* 34 (8), 1955 (346–8). [Cz.]

Tabulates various data (weight per hectolitre, number of cones per kg., age of trees, % of standing and felled trees from which the cones were harvested) for 4600 kg. of Larch cones and 39,000 kg. of Pine cones, representing some 150 cone shipments sent to the extraction plants in Czechoslovakia.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 1241, 1352, 1460.

1467. HUSS, E. Om behandling av barrträdens kott och frö. [**The treatment of cones and seeds of conifers.**] *Svenska SkogsvFören. Tidskr.* 51 (3), 1953 (230–41). [Sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 27.)

Recommendations on time of cone collection, storage of cones, seed extraction, de-winging and storage, with some results of an investigation into the effect of moisture content of the seed on germination and plant development. [Cf. *For. Abstr.* 16 (No. 1633).]

1468. NETOLICKÝ, J. K výstupu do korun stromů. [**Climbing to tree crowns.**] *Lesn. Práce* 34 (8), 1955 (358–63). [Cz.]

Points out that descending a tree is more difficult and dangerous that ascending it and describes with illustrations a method of descent using a mountaineering rope instead of climbing irons. Ease and speed are its chief merits.

1469. MÁTYÁS, V. Az érdei-és feketefenyömag ezermagsúly vizsgálatának eredményei. **[Investigation of thousand-seed weight in Scots and Austrian Pine.]** *Erdész. Kutatás, Budapest* 1954 (3) (83–104 + smries. in suppl.) [Hu.e.g.russ.]

An interim report on the author's investigations into 1000-seed weight as a possible means of distinguishing ecotypes of the tree species and whether it can be of practical use in the selection and standardization of seed supplies. Each species was divided into 10 provenances and these sub-divided into heavy or light (sandy) soils. Seed collected between 1949 and 1952 was weighed in batches, generally of 500, and the results are shown in tables and frequency graphs. For both species, the 1000-seed weights from sandy soils are shown to be greater than those from heavy soils; provenance weights did not show clear trends.

1470. FUISZ, J. A vetési magmennyiség meghatározása. **[Calculation of the seed quantities needed for sowing.]** *Erdész. Kutatás., Budapest* 1954 (4), (47–54 + smries. in suppl.). 12 refs. [Hu.e.g.russ.]

Stresses the importance of determining average (i.e. standard) 1000-seed weights for each tree species, against which local samples can be compared, so that appropriate quantities of the local seed (allowing also for purity % and germinative capacity) can be used. The variability in weight is exemplified for Scots Pine in a table, taking 7 g./1000 seeds as the norm, and such basic 1000-seed weights are listed for Scots and Austrian Pines, Spruce, Larch, the chief Hungarian broadleaved species, and the more important shrubs.

1471. **Investigation on seeds.** *For. Res. India Burma 1950–51, Pt. I*, 1955 (18–21).

Tabulated data are given on: (1) seed weight and germination of *Acacia cyanophylla, Adansonia digitata, Albizzia falcata, Aucoumea klaineana, Calamus caesia, Cinnamomum cassia, Copernicia cerifera, Hyphaene thebaica, Elaeodendron buchananii, Khaya senegalensis, Orbignya barbosiana,* and *Pinus halepensis*; and (2) germination % after storage for various periods in sealed tins, of *Acacia arabica, Albizzia procera, Leucaena glauca, Ochroma lagopus, Pueraria thunbergiana, Pinus elliottii, P. khasya, P. palustris, P. taeda,* and *Dendrocalamus strictus.* Viability of *Acacia arabica* seed was 3·7% after 14 years' storage; that of *Albizzia procera*, 3% after 22 years.

232.315. Seed Storage and Treatment

See also Nos. 1467, 1471, 1483–4, 1505–9.

1472. COULON, J., MOLLARD, J., BARRET, A., and VIEL, G. Retention de brome par les châtaignes traitées au bromure de methyle. **[Residual bromide in chestnuts fumigated with methyl bromide.]** *[Pap.] 3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/13-G*, 1955. pp. 7. 4 refs. [F.] Limited distribution.

It was found that chestnuts fumigated with MeBr as a measure to control *Balaninus elephas* and *Laspeyresia splendana*, may retain as much as 200 p.p.m. of bromide, and this treatment is therefore unsuited to chestnuts intended for human consumption.

1473. MARTOURET, D., and MOLLARD, J. Haute-fréquence et désinfection des grains et des denrées. **[High-frequency and the disinfestation of [chestnuts for] seed and food.]** *[Pap.] 3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/13-F*, 1955. pp. 6. 3 refs. [F.] Limited distribution. [Institut National de la Recherche Agronomique, Versailles.]

Disinfestation of insect-infested chestnuts was carried out with a 500-W, high-frequency, auto-oscillating generator, with a frequency of 30 megacycles. It was found that the lethal temperature for the insect larvae was 5–6° C. below that at which chemical changes take place in the chestnuts, which allows a safe margin for the regulation of the apparatus.

1474. Rapport sur les études effectuées à la station de technologie végétale de Versailles en 1953–54–55. **[Report on studies [on the storage of chestnuts] carried out at the Station de Technologie Végétale at Versailles 1953–55.]** *[Pap.] 3e Sess. Comm. int. Chât., Rome 1955*, No. *FAO/CH/13-E*, 1955. pp. 4. 3 refs. [F.] Limited distribution.

Apart from cold storage in a refrigerator, the most satisfactory method of storing chestnuts was the traditional one in what is called a '*boursier*'. The chestnuts, still enclosed in their burs, are piled in a heap ca. 50 cm. high. Exposure to rain or watering is considered advantageous, but the heaps are not pressed down. This method does not control insect attack, except perhaps by hampering their development through the CO_2 evolved in the interior of the heap; but it appears to inhibit the development of fungi. Experiments failed to isolate any anti-fungal agent in the chestnut burs. It was found that the bacterial population within the *boursier* increased in the first week from 10^6 to 10^7/g. and the distribution of species also changed. During the same period the temperature inside the *boursier* increased (by 3–4° C. in *boursiers* in the open air). Research is at present in progress on the possible fungistatic action of some of these bacteria.

1475. POURTET, J. Note sur la conservation des châtaignes. **[The storage of chestnuts.]** *[Pap.] 3e Sess. Comm. int. Chât., Rome 1955*, No. *FAO/CH/13-C*, 1955. pp. 4. [F.] Limited distribution.

An experiment made with two lots of chestnuts (*a*) wild, (*b*) cultivated, demonstrated that cold storage at 4° C. in glass jars in a refrigerator was satisfactory both for eating and seed chestnuts. Germinative capacity of (*b*) was inferior to that of (*a*), though germinative energy was about the same.

1476. SOLIGNAT, G. Note sur la conservation des châtaignes de semence. **[The storage of seed chestnuts.]** *[Pap.] 3e Sess. Comm. int. Chât., Rome 1955*, No. *FAO/CH/13-B*, 1955. pp. 11. 5 refs. [F.] Limited distribution.

Cold storage at 0° C. gives best results. Failing that, storage unhusked for not more than 2–3 months, at ca. 8°, and a fairly high relative humidity, is recommended. Stratification in sand was not quite so effective as the other methods.

1477. DALLEMAGNE, A. **The use of dehydrating charcoal for the preservation of chestnuts.** *[Pap.] 3e*

Sess. FAO Comm. int. Chât., Rome 1955, No. *FAO/CH*/13-*H*, 1955. pp. 1. Limited distribution.

In a 5-gal. can with a tight-fitting top were placed 500 g. of very fresh chestnuts, and inside the top were suspended 200 g. of an activated charcoal, the can being then hermetically sealed. When the can was opened 3 weeks later, it was found that the chestnuts were well dehydrated, weighed 300 g. and were in excellent condition; the weight of the charcoal had doubled.

1478. RIDÉ, M. Observations réalisées pendant la campagne 1954–55 sur les agents de pourriture des châtaignes à la récolte et en conservation. **[Observations made during the 1954–5 season on fungi damaging chestnuts at the time of harvesting and during storage.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955*, No. *FAO/CH*/13-*D*, 1955. pp. 10. [F.] Limited distribution.

The observations were made in two regions of France (Ardèche and Corrèze). The two micro-organisms most frequently found infesting chestnuts were *Rhacodiella castaneae* and *Phoma endogena*. The degree of infection varied with locality, with variety of tree, and with weather, site etc. Insects were found to do more damage than fungi. Experiments confirmed previous findings that stratification in sand is an unsatisfactory method of storing chestnuts and that refrigeration is the best method.

1479. AFANASIEV, M. **Storage of after-ripened seed of Eastern Redcedar.** *Tree Plant. Notes* No. 21, 1955 (28–30). 1 ref.

Tests showed that storage of stratified *Juniperus virginiana* seed in ice at + 20° F. for as long as 3 months does not impair its viability if germination does not occur in storage. Seed with radicles protruding through the endosperm showed injury after storage at + 20°; storage at + 4° and lower killed most of the seed. It is concluded that after-ripening and germination can be arrested by storing stratified but ungerminated seed at 15–20° F.

1480. CROSSLEY, D. I. **Viability of the seed of Lodgepole Pine [*Pinus contorta* var. *latifolia*] after 20 years in artificial storage.** *For. Chron.* 31 (3), 1955 (250–3). 3 refs.

Lodgepole Pine bears its seed crop in cones that remain unopened on the tree for many years. Viability apparently remains unimpaired for a long period under these natural yet specific conditions. This paper reports similar high viability of extracted seed stored for 20 years under very haphazard artificial conditions, and compares it with the results obtained from similarly stored White Spruce seed. Under suitable conditions, a 14-day test is sufficient to ascertain the viability of Lodgepole Pine seed. Pre-chilling, which was previously found effective in the preparation of White Spruce seed for germination tests, was unsuited to Lodgepole Pine seed under similar tests.

232.318. Seed Testing. Germination Tests. Seed Quality

See also No. 1471.

1481. EHRENBERG, C., GUSTAFSSON, Å., PLYM FORSHELL, C., and SIMAK, M. **Seed quality and the principles of forest genetics.** *Hereditas, Lund* 41 (3/4), 1955 (292–365 + 2 plates). 60 refs. [E.e.] O.R.S.

Outlines and discusses a number of related investigations (on Pine, unless otherwise stated) most of which have already been reported [see *For. Abstr.* 15 (No. 3476); 17 (No. 332) etc.]. The following are the main points brought out: (1) X-ray examination of seed of Pine, Spruce and Alder gives a satisfactory indication of endosperm and embryo development and hence of seed quality. (2) Selfed seed and seed from species crosses show arrest of embryo development often resulting in a high % of empty or polyembryonic seeds. (3) Seed from more northerly latitudes and high altitudes is generally of poorer quality; in bad summers in N. Sweden, large cones give better-quality seed. (4) Minus trees tend to produce larger cones and a higher 1000-seed weight than normal or plus trees in the same stand. (5) Graft material from trees of northern provenances gives better-quality seed when grown in more southerly nurseries than the mother trees. (6) Analysis of seed from an Arctic population indicates the presence of genetically determined differences in embryo development. (7) X-ray photographs of Pine and Spruce seeds can be used to predict the extent and speed of germination. (8) The absolute amount of water absorbed by Pine seeds appears to be independent of embryo type, reaching 2·4–2·8 mg. per seed in 100 hours. Germination of class-IV seeds (embryo fully developed) reaches a maximum at 120–130 hours, and that of class-III (incompletely developed embryo filling $\frac{1}{2}$–$\frac{3}{4}$ of the embryo cavity) at 140 hours, while that of class-II seeds (one or more embryos, each occupying $< \frac{1}{2}$ of the embryo cavity) does not reach a peak, but the flat maximum region stretches from 150 to 250 hours. (9) Height growth of seedlings up to 3 years is closely related to embryo development, genetic factors becoming more important later. Progenies of minus trees often show stunted growth, caused by genetic factors, although their larger cones are related to higher 1000-seed weight and more rapid early growth. (10) In Spruce, material of foreign provenance shows larger cones, higher 1000-seed weight, better germination and genetically superior final yield as compared with Swedish material. The importance of these results for tree-breeding is discussed.

1482. SIMAK, M. Bestämning av insektskador på granfrö medelst röntgenfotografering. **[Determination of insect damage to Spruce seeds by X-ray photography.]** *Norrlands SkogsvFörb. Tidskr.* 1955 (3), (299–310). 12 refs. [Sw.e.]

X-ray photographs showed that damaged seeds were divided into two groups: (1) those containing larvae (of *Plemeliella abietina*, or infrequently *Megastigmus abietis*); (2) those damaged, but containing no larvae (the main insects involved were *Ernobius abietis*, *Laspeyresia strobilella*, and *Dioryctria abietella*, all of which live in the woody part of the cone, identified by the nature of the damage and the presence of frass). The distinction between the two groups applies only to freshly gathered seed. Insects of group (1) decreased in number in cones

from more northerly districts, *P. abietina* being found only sporadically in material N. of lat. 62°. Insects in group (2) were found in material from further north but were very much less frequent than *P. abietina*. The figures are possibly misleading for this group because the material was taken from cones collected for seed, and cones that were obviously heavily infested would not be picked. The degree of damage decreased with increasing altitude. There were considerable variations between trees and stands. Infested cones were usually smaller than healthy ones and the % of empty seeds was in direct relation to infestation by group (2), but not group (1), insects. Seed quality was determined by X-ray photographs [cf. *For. Abstr.* 14 (No. 3294)]. Sound seeds from cones infested by group (1) insects showed embryo spectra similar to the controls, while those from cones infested by group (2) insects were considerably inferior. The advantages of the X-ray method are stressed.

1483. HOLMES, G. D., and BUSZEWICZ, G. **Forest tree seed investigations.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (1–4).

The seed pre-chilling technique described in the previous year's report [cf. *For. Abstr.* 16 (No. 1623)] has been adopted as a standard treatment for seed samples of Douglas Fir, Sitka Spruce, and Lodgepole Pine, to accelerate germination in the laboratory. The tetrazolium rapid viability test has been applied only to late-arriving samples on which a quick report was essential, and has in all cases been checked by standard germination test methods. Its disadvantage is the amount of time and skill required in seed-cutting and embryo extraction and classification. The tetrazolium technique has been found most valuable for testing species such as *Pinus peuce*, and *Fraxinus*, *Tilia* and *Prunus* spp., which have dormant seeds and are difficult to test by other methods without prolonged pre-treatment. An investigation into the longevity of acorns stored under a variety of conditions was started in 1950. Examination of samples after 3 years showed that storage in air-dry granulated peat at a constant temperature of 36° F. was the best method. Germination tests showed only a small drop in seed germinative capacity over the 3 years, though germinative energy was considerably reduced.

1484. HOLMES, G. D., and BUSZEWICZ, G. **Experiments with cold-wet pretreatment as a method of increasing the germination rate of seed of Douglas Fir, Sitka Spruce and Lodgepole Pine.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (84–91). 9 refs.

Pretreatment by soaking the seed in water or on wet blotting-paper for 21 days at 36° F. gave maximum increase of germination rate in Sitka Spruce. No treatment had any consistent effect on germinative capacity of Douglas Fir, with the exception of soaking in water at room temperature, which caused a depression if continued beyond 7 days; soaking on wet blotting-paper for 21 days at 36° accelerated germination most. Germinative capacity of Lodgepole Pine was not greatly affected by treatment; germination was much accelerated by soaking in water or on wet blotting-paper at 36°.

1485. LAMPRECHT. **Germination tests of *Cecropia nigra* seeds.** *For. News Latin Amer. FAO* No. 7, 1955 (4). [E.]

Results of preliminary tests giving date of collection and sowing, treatment, and dates and % of germination.

1486. **[Germination of locally grown Eucalypt seed in Cyprus.]** *Rep. For. Dep. Cyprus 1954*, 1955 (62).

Uniformly low results obtained from sowing in both calcareous and non-calcareous soil, showed clearly that a high content of lime is not the factor responsible for the low germination rate of Eucalypt seed obtained in the nurseries of the Cyprus Forest Department. It had been supposed that locally collected seed had a much higher germination capacity than seed imported from Australia, but germination tests of 29 samples of Eucalypt seed of 15 different species, all locally collected, did not bear this out, the results showing a uniformly low or nil germination.

232.32. Plant Rearing. Nursery Practice

See also Nos. 1583, 1594, 1884.

1487. DUDOREV, M. A. Lesomeliorativnyĭ pitomnik. **[Nursery practice for the production of planting stock in the steppe and forest-steppe regions of the U.S.S.R.]** Seljhozgiz, Moscow. 1954. pp. 185. [Russ.]

A practical guide to the raising of species used in protective forests and shelterbelts and species grown for fruit (including shrubs grown for soft fruit). All aspects of nursery work are covered in a semi-popular manner.

1488. RIMLER, L. A csemetetermelés gépesitésének mai helyzete. **[The present position of mechanization in [Hungarian] nurseries.]** *Erdö* 3 (8), 1954 (276–9). [Hu.]

Brief specifications, performance figures and illustrations are given of cultivators, seed drillers and lifting equipment manufactured in Hungary. Mechanical cultivation of nurseries in Hungary is far from universal and the annual production of seedlings is well below the target of 260,000 per ha. of nursery bed.

1489. LESZNYÁK, J. Nagyüzemi csemetetermelési tapasztalatok. **[Experience in large-scale nursery cultivation.]** *Erdö* 3 (8), 1954 (280–2). [Hu.]

Experimental mechanization of a 54-ha. nursery reduced manpower requirements from 7·5 to 0·75 per hold. Ploughing was done to 25–30 cm. by tractor and seeds drilled (or large seeds broadcast) in furrows 6–8 cm. wide, spaced 60 cm. apart. Machine cultivation was done between, and hand cultivation in, the rows. The lifting equipment employed cut the tap-roots of seedlings at 25–30 cm. depth, without harming the other roots. The annual production of the nursery (three-year average/ha.) was increased to 500,000 Oak, 160,000 Poplar, 280,000 *Celtis*, 280,000 Maple and 200,000 Robinia

seedlings at greatly reduced cost. Sudden attacks of pests had to be vigorously controlled and there was some difficulty with mechanical weeding during wet spells.

1490. KARLBERG, S. Rationaliseringsåtgärder i nordamerikanska skogsplantskolor. **[Rationalization in North American forest nurseries.]** *Svenska SkogsvFören. Tidskr.* 51 (2), 1953 (183–208). 11 refs. [Sw.]

Discusses the increasing mechanization of work.

1491. HOLMES, G. D., and FAULKNER, R. **Experimental work in nurseries.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (5–18).

Partial sterilization of the soil: Further 'user-scale' trials of formalin as a soil-sterilizer revealed a number of practical disadvantages for large-scale use, the most important being the large volume of water required to secure adequate penetration of the chemical into the soil. In view of the promising results obtained with chloropicrin [cf. *For. Abstr.* 17 (No. 341)] when injected at rates as low as 20 gal./acre, experiments were started to compare formalin and chloropicrin in 3 Scottish nurseries. Results from all nurseries showed chloropicrin to be a more efficient soil-sterilizing agent than formalin in so far as it produced seedlings with greater mean heights, though it slightly reduced the total number. There were no significant differences between injection at depths of 3 and at 5 in. *Seedbed compaction*: Further experiments showed that rolling with a medium-weight (1–4 cwt.) roller before sowing is a safe and satisfactory procedure, and that additional firming or rolling is unnecessary [cf. *For. Abstr.* 16 (No. 1652)]. *Chemical control of weeds*: Experiments are being made with several weedkillers, applied one month after cultivation to fallow plots in forest nurseries. $NaClO_3$ applied at 300 lb./200 gal. water/acre gave a high degree of control of annual weeds. Na trichloracetate (NaTCA) gave rather variable results; chlorphenyl dimethylurea (CMU) applied as a wettable powder in water at 2·5–40 lb./200 gal./acre was highly toxic and persistent even at low dosages. Perennial weeds were more resistant. *Agropyron repens* was killed only by the heaviest rates of NaTCA; it was severely checked by CMU at 40 lb. and $NaClO_3$ at 300–600 lb., but regrowth appeared several months after treatment. Parts of the treated plots were later sown or planted with common conifer and hardwood species, to assess residual toxic effects. Preliminary results showed that NaTCA and $NaClO_3$ appear to have no harmful residues. CMU, however, was more persistent, and transplants of Japanese Larch on treated plots showed severe discoloration of foliage. Large-scale trials were carried out in 10 nurseries to test pre-emergence and post-emergence applications of mineral oils for weed control in conifer seedbeds: results were consistently good, and high degrees of weed control were obtained with negligible crop damage, provided that maximum application rates were not exceeded. Application of vaporizing oil as a pre-emergence spray has resulted in a general reduction of 50–75% in the costs of hand weeding during the season of treatment. Post-emergence spraying with white spirit for control of weeds germinating after the pre-emergence treatment, has resulted in a further reduction of ca. 20% on hand weeding costs. Allyl alcohol applied as a soil 'drench' to the seedbed before sowing resulted in great reductions in weed growth. Applications at concentrations from 0·2 to 0·8%/gal. aqueous solution/sq. yd. had no injurious effect on the subsequent crop of Sitka Spruce seedlings, and rates of 0·4% and over reduced weeding by 95%. This chemical is, however, dangerous and offensive to use. Undecylenic acid, which had shown some promise as a selective weedkiller on Sitka Spruce beds, gave disappointing results. Trials were continued with SES, a 2,4-D formulation becoming phytotoxic only after several days' contact with the soil. Applied as a post-emergence spray at rates up to 2 lb./100 gal. water/acre, SES has given appreciable savings in weeding time. As many as 4 applications in the season caused no apparent injury to 1-year seedlings of Scots Pine and Sitka Spruce. *Seedbed irrigation*: Continued trials of an overhead sprinkler system for making up deficiencies in rainfall confirmed previous results [cf. *For. Abstr.* 15 (No. 1287)]. Comparison of compost, mineral fertilizers, and compost + fertilizers as manurial treatments within each irrigation plot, showed that all manures increased seedling growth, but that the increases were considerably greater in watered than in unwatered plots. Sowing date was an important factor in determining seedling production and growth, irrespective of irrigation treatment. *Intensive methods of raising Sitka Spruce seedlings*: Small-scale work on this project of using artificial heat and light to promote rapid germination and growth early in the year was continued. For this purpose, 15-, 25-, and 30-watt electric light bulbs were spaced at regular intervals inside and outside a 'Dutch light' frame, to give loadings of ca. (*a*) 13, (*b*) 22, and (*c*) 35 watts/sq. ft. respectively. Seed was sown in boxes 5 in. below the level of the light bulbs in Feb. and March, in frames and in the open. Inside the frame (*c*) advanced the date of germination by 36 days, to 10 days from date of sowing, (*b*) and (*a*) initiated germination respectively 3 and 6 days after (*c*). Outside the frame, seed under (*c*) germinated first, 27 days before the control, (*a*) and (*b*) simultaneously 12 days later. The lights were switched off in mid-May, and the plants inside the frame were hardened off before complete removal of overhead glass. The results are similar to those obtained in previous years with the aid of both bottom heat and overhead illumination, which required more electric current [cf. *For. Abstr.* 16 (No. 1652)]. *Storage of first-year seedlings from heathland nurseries*: Plants of Scots and Lodgepole Pine and Japanese Larch were lifted at monthly intervals from Nov. to March and stored in: (*a*) uncovered boxes in the forest, (*b*) boxes covered with roofing felt, (*c*) boxes in a well ventilated shed, (*d*) moss sheughs (shallow trenches) in the forest, and (*e*) soil sheughs in the open nursery. In all cases, plants were stored both loose and in bundles, were lined out in April and were assessed in the following Oct. The results showed that (*d*) and (*e*) were the most satisfactory treatments, irrespective of date of storage or whether bundled or

loose, giving a survival of 75–94% depending on species. Treatment (*c*) gave a maximum survival of 7% and in some cases all plants died. Survival of (*a*) was 61–75%, and of (*b*) 27–29%.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 1156, 1163, 1336, 1491, 1698, 1730.

1492. WYCOFF, H. B. **Methyl bromide fumigation of an Illinois nursery soil.** *J. For.* 53 (11), 1955 (811–3). 6 refs.

[Cf. *For. Abstr.* 13 (No. 3782).] Gives detailed costing and full instructions on practical application and the precautions required. Very impressive economies were effected (46% of the cost of 1 + 0 conifer stock) by the prevention of damping off and by the reduction of weeding. Seed rates were reduced 50% and the growth and improvement of the stock (*Pinus resinosa* and *Pinus strobus*) were improved.

1493. HILL, J. A. **Methyl bromide gas controls weeds, nematodes, and root rots in seedbeds.** *Tree Plant. Notes* No. 21, 1955 (11–4). 3 refs.

Treatment of seedbeds, before sowing, with methyl-bromide gas at 1 lb./48 sq. ft., gave the following increases in first-year survival: *Picea glauca* 372%, *P. abies* 95%, *Pinus sylvestris* 1730%, *P. resinosa* 161%. Losses % by nematode attack on heavily infested ground, by the end of the second year, were reduced as follows *Picea glauca* from 90·5 to 21·1, *P. abies* 58·0 to 46·8, *Pinus sylvestris* 66·1 to 39·4, and *P. resinosa* 41·5 to 17·0. The treatment has one drawback—the appearance in treated beds of patches, from a few inches to a foot or more in diameter, of stunted, chlorotic seedlings. The cause of this effect is not known, but it is suggested that the gas may be immobilizing some of the elements in the soil.

1494. PARTOS, G. Csemetekertek trágyázása. **[Fertilizing of nurseries.]** *Erdö* 3 (8), 1954 (283–6). [Hu.]

Discusses the preparation of composts from plant residues and farmyard manure. The compost heap should preferably be treated with 0·5–2% superphosphate and potash and soaked in liquid manure or given 1·5–3% of a mineral N fertilizer before fermentation. Earth composts containing < 5% Ca must be limed. The compost should be spread in nurseries every third year in layers 1–1·5 cm. thick, corresponding to 100–150 cu.m./ha.

1495. FAULKNER, R. **Experiments on applying various forms of nitrogen to Sitka Spruce seedbeds in Scotland.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (91–101). 1 ref.

Summarizes long-term trials. The evidence indicates that, of the materials tested (flash, formalized casein and Nitrochalk), Nitrochalk is the most economical and suitable for application to conifer seedbeds. [Cf. *For. Abstr.* 15 (Nos. 1287, 3484).]

1496. BRAMMANIS, L., and ERNSTSON, M. Skador på 1954 års omskolade granplantor. **[Damage to Spruce transplants in 1954.]** *Skogen* 42 (23), 1955 (443). [Sw.]

Nurseries in S. and Central Sweden reported brown discoloration, often causing death, on some 10–20% of Spruce transplants in the late summer of 1954. In a combined experiment on manuring and insect control laid out in spring 1954 at the nurseries of Fiskeby Fabrik AB, at Simonstorp, this discoloration was found in spots of transplants treated with 40 g. superphosphate and 30 g. K_2O/sq. m. but not in the 9 other plots treated with compost, litter, manure, or commercial BHC powders at different rates, nor in the 2 control plots. Spruce and Pine seedlings and Pine transplants were undamaged. Plots treated with Hexa [BHC-type] or Lindan [γBHC-type] powder at high rates (80 and 50 g./sq. m. respectively) have not so far shown evidence of damage.

232.323. Sowing and Covering

See also Nos. 1354–5, 1470, 1491.

1497. SUNDIN, L., and SÖDERSTRÖM, V. Några markundersökningar och såddförsök i plantskolor. **[Some soil [moisture and temperature] investigations and sowing trials in nurseries.]** *Svenska Skogsv-Fören. Tidskr.* 52 (1), 1954 (51–76). 17 refs. [Sw.sw.]

Measurements between 13 June and 22 August of moisture (based on original weight of sample and weight after drying in a thermostat) in soil samples taken from the surface, at seed depth and at 5 cm., showed that moisture was almost invariably greater in furrows sunk to a lower level, using a special marking board (illustrated), than in normal furrows; temperatures, however, were only slightly lower in these special furrows. In nursery experiments with Spruce, sowing in the special furrows gave higher plant %s than sowing in normal furrows, especially with later sowings. No general conclusions can be drawn, because of the limited nature of the experiment, and further trials are necessary.

1498. BAKKAY, L. Nyár magcsemetenevelés. **[The raising of Poplar seedlings.]** *Erdö* 3 (8), 1954 (267–70). [Hu.]

Much of the failure in growing Poplar from seed rather than from cuttings is said to be due to inadequate sowing techniques. The seeds preserve full germinating capacity for more than a week, but owing to their smallness they do not tolerate a soil cover thicker than 1–2 mm. It is recommended that drills should be rolled both before and after sowing, thus providing a compact seedbed in which the seeds remain near the surface. To maintain constant moisture and protect the soil against raindrop-impact, the nursery should receive overhead irrigation and be covered with loose straw on about 30–40% of its area, preferably limited to 5 ha. The straw must be removed progressively with the appearance of the first and second leaves, when the seedlings should be thinned to 35–60 per m. of row. Plants of 3 mm. diameter at 4 cm. above ground may then be transplanted.

1499. ENGSTROM, A. **Polyethylene film for seedbed mulch.** *Tree Plant. Notes* No. 21, 1955 (26–7).

Good germination of *Juniperus virginiana* seed in Oklahoma was obtained by applying ca. ¼ in. of sawdust to the seedbeds after sowing, watering well, and then laying polyethylene film over the beds. Burlap is laid over the polyethylene, and both are pegged down. Sowing is in December and germination is usually complete by the middle of March, when the coverings are removed, the burlap being laid over a lath shade for a further 10 days to provide shelter from sun and frost.

1500. CLIFFORD, E. D. **The use of sawdust as a mulch on Red, White, and Jack Pine seedbeds.** *Tree Plant Notes* No. 21, 1955 (24–5). 1 ref.

Autumn sowing in Michigan involves the use of a mulch in order to prevent the seed being blown away, and it has been usual to apply hay, straw or burlap, which must be removed as soon as germination has taken place. It was found that a ½-in. layer of sawdust [unspecified] rolled in, gave slightly better results than straw, and was much cheaper, both in itself and because it need not be removed.

232.324. Transplanting and Lining Out, including Grading of Seedlings

1501. HEINSTEDT, D. Arbetsstudier i plantskolor. [**Work studies in nurseries.**] *Från skogsvårdsstyrelsernas arbetsfält* pp. 23*–33*. [Sw.] *Suppl.* to *Svenska SkogsvFören. Tidskr.* 52 (3), 1954.

Work studies on lifting and transplanting were made at a number of nurseries. In most cases too many factors were involved and material was insufficient for statistical analysis of the results, which are briefly discussed. Subjects covered include the organization of work in lifting, bundling and sorting (e.g. size of crew, division of work); working technique—i.e. the effect of posture and hand movements (illustrated from films taken during the study) on speed and quality of work and on fatigue; the effect—shown in graphs to be slight—of increasing fatigue through the working period on speed in plant lifting and transplanting; and the effect of wet or fine weather—apparently negligible—on speed.

1502. JEFFERS, J. N. R. **Relationship between the percentage of usable conifer seedlings and the mean height of seedlings as assessed at stocktaking.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (101–6). 2 refs.

A table has been constructed showing % of usable seedlings for mean heights in tenths of inches, of Scots Pine, Japanese Larch, Douglas Fir, Norway Spruce and Sitka Spruce in the nursery. The statistical methods used are explained.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also Nos. 1354, 1491–3, 1499. 1500, 1532.

1503. HOSNER, J. F. **Preliminary tests with surfactants [wetting agents] fail to show increase in either growth or survival of Scotch Pine seedlings.** *Tree Plant. Notes* No. 21, 1955 (15–6). 2 refs.

It is concluded that, under the conditions and rates of application used, the two wetting agents (ethylene-oxide-thioether condensate and Na-alkyl-aryl-sulphonate) did not give better first-year growth of nursery seedlings (receiving normal overhead irrigation), or better first-year survival of field-planted 1 + 0 Scots Pine seedlings.

232.326. Salvage of Overgrown Seedlings and Transplants. Root Pruning etc.

See also No. 1338.

1504. BÖLCS, I. A suháng- és a sorfanevelés. [**The raising of large transplants and ornamental trees.**] *Erdö* 3 (8), 1954 (263–6). [Hu.]

Excellent nursery stock was obtained by shortening the roots of hardwood seedlings to 15 cm. and planting them in well prepared soil at 0·8 × 0·8 or 0·6 × 0·6 m. The seedlings were cut back to a single leader and pruned to the third or fourth leaf every June and July until they had reached a height of 2–2·20 m.; they were again transplanted after 2–4 years. A good crown can be thus produced with 3–4 symmetrically trained branches.

232.327. Protection Measures in Nurseries

See also Nos. 1324, 1492–3, 1730–1.

1505. CRAM, W. H., and VAARTAJA, O. **Toxicity of eight pesticides to Spruce and Caragana seed.** *For. Chron.* 31 (3), 1955 (247–9). 6 refs.

Fungicides were applied to seeds of *Caragana arborescens* and *Picea pungens*, at the maximum adhering dosages. The toxicity was evaluated in terms of subsequent germination. Fungicides applied before stratification had little or no influence upon the germination of either species, except that Ceresan M reduced germinative capacity and germinative speed of Caragana and germinative speed of Spruce seed. Some post-stratification treatments proved detrimental to the germination of both species; Ceresan M, chinosol, and Manzate [maneb-type] were essentially lethal; Stauffer N-244, thiram preparates, Spergon SL [chloranil-type], and Orthocide [75% captan] proved mildly toxic. Surface sterilization of seed before and after stratification with a 0·5% solution of $HgCl_2$, with a water rinse, was harmless. [Cf. *For. Abstr.* 17 (No. 356).] *From authors' summary.*

1506. MORRIS, C. L. **Treatment of forest-tree seed with chemical protectants.** *Tree Plant. Notes* No. 21, 1955 (9–10). [State Dep. of Forests and Waters, Harrisburg, Pa.]

Two small-scale trials were made of dusting conifer seeds with Arasan [thiram type] before sowing in order to control damping off. Indications are that treatment was beneficial, but further tests are needed to determine optimum quantities of the fungicide for different seeds.

1507. COCKERILL, J. **The use of thiram as a control for damping-off of Red Pine.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (1).

Pinus resinosa seed was pelleted before sowing with 50% thiram (as Arasan) using 2% methyl cellulose as a binder, at 3 concentrations: (*a*) 4 oz., (*b*) 8 oz. and (*c*) 12 oz. per lb. of seed. For the period of observation, mortality was 31·3% of

seedling emergence for (*a*), 22·6% for (*b*), 16·1% for (*c*) and 74·4% for controls. Thiram was less effective against *Rhizoctonia* spp. than against *Fusarium* spp.

1508. DERR, K. F. **Control of damping-off at Boscobel State Nursery in Wisconsin.** *Tree Plant. Notes* No. 21, 1955 (7–8). [State Nursery, Boscobel, Wis.]

Seed of *Pinus strobus*, *P. resinosa*, *Picea glauca* and *P. abies* was treated with Arasan [50% thiram], with methyl cellulose as a sticker, before sowing in the autumn, in proportions of 1 lb. Arasan/2 lb. seed as well as 1/4 and 1/8. The tests showed that 1/4 gave maximum control of damping-off with the least amount of fungicide. The sticker held the Arasan on the seed-coat throughout the winter and left some of it on the seed after the seed-coat had fallen to the ground. While the seed-coat remained on the small emerged plant, rain and overhead irrigation washed small amounts of the fungicide from the seed-coat, down the stem, and on to the ground around the plant, resulting in control of damping off. Late damping off during the summer was controlled by spraying with Tersan [75% thiram] at a rate of ½ g./sq. ft.

1509. KAHLER, L. H. **Pelleting conifer seeds for control of damping-off.** *Tree Plant. Notes* No. 21, 1955 (3–6). [Union State Tree Nursery, Jonesboro, Illinois.]

Stratified seed of Shortleaf, Loblolly and Scots Pine were treated with (*a*) captan 50 W and (*b*) 75% thiram [tetramethylthiuram disulphide] in a Dybvig seed-cleaner adapted for pelleting. No injury to seed or seedlings was observed in any of the tests, and germination rates were almost the same for treated and untreated seed. Seed was sown in April and counts made 21 days later showed only a small number of damped-off seedlings from treated seed. Counts were again made in August when, despite the reduced density of sowing for treated seed, the number of live trees per linear foot in treated sowings was greater than that of untreated. Bird damage in untreated sowings was considerably heavier than in treated. The possibility of incorporating a soluble fertilizer in the pelleting process had to be abandoned, as it caused the methyl-cellulose solution to lose its adhesive property.

1510. GIBSON, I. A. S. **Trials of fungicides for the control of damping-off in Pine seedlings.** *E. Afr. agric. J.* 21 (2), 1955 (96–102). 8 refs.

Details the results, in reduction of seedling loss, of treatments with 11 substances, some at varying strengths. The dithiocarbamate type is likely to be the most successful in the field, though with some doubt for wetter and colder conditions. Perenox (active ingredient Cu_2O) may well prove unreliable. Organo - mercurial preparations at commercial strengths (generally < 10% active ingredient) seem unlikely to give good control; at higher rates they might be more effective but too costly. Dithane Z-78 (Zn ethylene bisdithiocarbamate 65%) appears at present to be the best (in terms of cost, control and absence of phytotoxic effects) for extensive field trials.

1511. PEACE, T. R. **Observations on *Keithia thujina* and on the possibility of avoiding attack by growing *Thuja* in isolated nurseries.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (144–8). 10 refs.

1512. HILL, J. A. **Control of strawberry root weevil [*Brachyrhinus ovatus*] in the New York State nurseries.** *Tree Plant. Notes* No. 21, 1955 (17–20).

Gives an account of the life history and feeding habits of the weevil, and the control of a heavy nursery infestation by spraying the beds with dieldrin at 0·5 lb. 50% wettable powder in 25 gal. water/acre. [Cf. *For. Abstr.* 15 (Nos. 231, 493).]

1513. SMITH, D. N. **Use of chlordane at Duncan Forest Nursery.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (2).

Chlordane is applied to the soil before sowing, as a preventive measure against the strawberry root weevil (*Brachyrhinus ovatus*). During the 5 years of its use there has been no large loss of seedlings and no sign of phytotoxicity.

1514. FORSSLUND, K.-H. Harkranklarver som skadegörare i plantskolor. **[Tipulid larvae as pests in forest nurseries.]** *Svenska SkogsvFören. Tidskr.* 52 (1), 1954 (43–50). 11 refs. [Sw.g.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 29.)

In 1953, damage by larvae, identified as those of *Nephrotoma cornicina*, to Spruce in a nursery in Dalarna was recorded for the first time. Damage by Tipulidae in Germany, distribution of Tipulidae in Sweden, and methods of chemical control are discussed.

232.328. Vegetative Propagation

See also Nos. 1213, 1232, 1260, 1299, 1348.

1515. MCCLURE, F. A. **Propagation of Bamboo by whole-culm cuttings.** *Proc. Amer. Soc. hort. Sci.* 65, 1955 (283–8). 14 refs. E.M.B.

Propagation of clump Bamboos by whole-culm cuttings without rhizomes is effective for some species. It is particularly well suited for propagating *Bambusa polymorpha*, *B. tulda*, *B. ventricosa*, *Cephalostachyum pergracile*, *Gigantochloa apus*, *Guadua angustifolia* and *Sinocalamus oldhami*. *From author's summary.*

1516. VIEITEZ, E. Toxicidad y capacidad rizogénica de algunos tratamientos hormonales empleadas en la reproducción vegetativo del castaño. **[Toxicity and root-inducing effect of some treatments with growth substances used for the vegetative propagation of Chestnut.]** *An. Edafol. Fisiol. veg.* 14 (6), 1955 (313–65). 11 refs. [Span.span.e.] E.M.B.

A series of 22 experiments are reported in which 19 growth substances were tested singly or in mixtures. They were applied in lanolin paste on 2 different dates—5 May and 6 June. The most effective root-inducing substance was 3-indole-butyric acid, with an optimum dose of 12 mg./g., higher concentrations having toxic effects. The root-inducing capacity of a mixture of 5 mg./g.

3-indolebutyric acid + 5 mg./g. α-naphthaleneacetic acid was increased by adding 0·1–0·3 mg./g. of 2,4-D or one of its salts; higher concentrations of 2,4-D proved toxic. Addition of MCPA to the basic growth-substance mixture did not stimulate rooting. When 2,5-D was substituted for 2,4-D no rooting took place. Both toxic and rooting effects of the treatment were greater in the May than in the June series.

1517. HEITMÜLLER, H.-H. Vegetative Vermehrung unter Verwendung von Wuchsstoffen bei *Populus canescens* Smith und *Populus tremula* L. **[Vegetative propagation of *P. canescens* and *P. tremula* with the aid of growth regulators.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (135–6). [G.]

Roots taken from a *P. tremula* that was too old to produce cuttings were induced to shoot. These shoots were then taken as green cuttings and were induced to root; in the winter of their third year, lignified cuttings were taken from them, and were successfully rooted (27%) with the aid of growth regulators. Cuttings of *P. canescens* produced in the same way rooted even better. In all experiments, cuttings treated for up to 24 hours with moderate concentrations of the growth regulators, before finally being placed in the substrate, gave better results than controls.

1518. VIEITEZ, E. Problemas que plantea el estaquillado del castaño. **[Problems of layering Chestnut.]** [*Pap.*] *3e Sess. Comm. int. Chât., Rome 1955* No. *FAO/CH*/18-*B*, 1955. pp. 16. 7 refs. [Span.span.] Limited distribution.

1519. VIEITEZ, E. El empleo de sustancias de acción hormonal en el enraizamiento del castaño por acodo bajo. **[The use of growth-regulating substances in layering Chestnut.]** *An. Edafol. Fisiol. veg.* 14 (9/10), 1955 (483–518). 5 refs. [Span.span.e.] E.M.B.

Successful rooting was obtained by the application of growth-regulators in lanolin paste to vigorous upright shoots during late May or early June. The most effective treatments were: 3 mg./g. 2,4-dichlorophenoxy-*n*-butyric acid, 1 mg./g. 3-indolylbutyric acid + 0·3 mg./g. 2,4-dichlorophenoxy triethanolamine or dimethylamine of 2,4-D or 12 mg./g. 3-indolyl-butyric acid. A small amount of the paste was smeared round the shoot to a height of 2·3 cm. It was then covered with sphagnum moss and a light layer of soil. For 2,4-D, concentrations not higher than 0·3 mg./g. should be used; its amines, especially triethanolamine or dimethylamine, are recommended as being less toxic.

1520. DAVID, R. L'influence de divers facteurs sur la multiplication végétative du pin maritime. **[The influence of various factors on the vegetative propagation of *P. pinaster*.]** *C.R. Soc. Biol., Paris* 149 (11/12), 1955 (1272–3). 4 refs. [F.] O.R.S.

The technique of air-layering used was that already described [see *For. Abstr.* 15 (No. 1300)]. Observations showed that: (1) root formation took place in July–Sept., and if roots had not formed by winter, none formed the following spring; (2) a two-stage technique, the paste and wrapping applied in March being replaced by moss and nylon in early July, gave results better than those using a single-stage technique in March and equal to those using a single-stage technique in July; and (3) an indolylacetic acid concentrations of 1·5% gave better results than concentrations of 0·7 and 2·7%.

1521. LANGNER, W. Spontane Wurzelbildung an einem Lärchenpropfreis (*Larix leptolepis*). **[Spontaneous root formation on a Japanese Larch scion.]** *Abstr.* in *Z. Forstgenet.* 3 (6), 1954 (139). [G.]

Roots were formed at the base of a scion taken from a young mixoploid Japanese Larch. ca. 3 months after grafting on to a rootstock.

1522. MERGEN, F. **Grafting Slash Pine in the field and in the greenhouse.** *J. For.* 53 (11), 1955 (836–42). 16 refs. [Yale University.]

Reviews the literature and describes the results of a trial with 240 scions, using cleft, side, and bottle grafts in the greenhouse and the field. Bottle grafts were best in both, attaining 95% success in open-field conditions under partial shade. The recommendation for North Florida is to bottle-graft on 2- and 3-year-old plantations during early or middle February, providing shade from the midday sun, e.g. by a sack on a post. The stocks should be weeded and fertilized before grafting. The bottle graft is made by approximating similar cut surfaces up to 3 in. long on scion and stock, with at least one cambium pair in contact, sealing them firmly with grafting rubber, friction tape, and wax, and keeping the free end of the scion in a vial of water to which several drops of a weak ferbam suspension is added. The seal is replaced early in May by a loose wrapping as support against wind.

1523. LJUNGER, Å. Boken i fröplantager—förutsättningar och möjligheter. **[Beech in seed orchards—necessary conditions and possibilities.]** *Skogen* 42 (20), 1955 (362–4). [Sw.]

In spring 1953, 600 side grafts were made in greenhouse experiments at Ekebo, using material from 20 plus-trees. On 443 of the scions the buds were shortened by varying amounts to reduce evaporation from the leaves; on the rest, the buds were left whole. Tabulated results show that 67% of the grafts with shortened buds were alive in the autumn after grafting, compared with 4% of those with whole buds. Mortality was only 7% for 1953–54 and 3% 1954–55. These results are considered very satisfactory. The selection of suitable material from the many stands of good Beech in Sweden is discussed.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See No. 1620.

232.33. Formation of Stands by Direct Sowing

See also Nos. 1426, 1553, 1885.

1524. **[Reforestation of bare mountain forest in Cyprus.]** *Rep. For. Dep. Cyprus 1954*, 1955 (22).

A technique of patch cultivation has been worked out, which appears to be well adapted to the conditions of the country and is the cheapest form of

reforestation yet achieved for these conditions. Patches 15 × 18 ft. are cleared in staggered lines along the hillside, cultivated by pick-axe to a depth of 8–9 in., and sown with a mixture of *Pinus halepensis* var. *brutia* and *Cupressus sempervirens* seed. Total cost works out at ca. £2/donum (0·33 acres) of hillside treated. Sowing in January usually gave best results; earlier sowings give good initial germination, but seedlings are then smothered by a heavy growth of weeds.

1525. **Effect of cultivation on the growth and survival of Stone Pine [*Pinus pinea*] seedlings on an area of reclaimed sand-dune at Ayia Irini.** *Rep. For. Dep. Cyprus 1954*, 1955 (62).

A pilot experiment in 1952 was followed by field trials in 1953 and 1954 with excellent results, seedlings showing great improvement in growth rate and vigour. It has been shown that cultivation can, with advantage, be continued for the first 2–3 years after sowing. This technique has now been adopted as standard.

1526. **[Sowing experiments with Black Wattle.]** *Rep. Wattle Res. Inst. S. Afr. 1954/55*, 1955 (14–5).

The treatments were: (*a*) hoeing narrow seedbeds to bury the litter and bring the [naturally fallen] seed into contact with the mineral soil; (*b*) sowing treated seeds in holes 3 ft. apart; (*c*) burning low ridges of raked-up litter to stimulate the germination of [naturally fallen] seed; (*d*) sowing treated seed in continuous drills. All treatments were aligned close to the old stumps and the close-grown treatments were thinned by hand pulling to a mean spacing of 3 ft. At 7 months (*d*) had significantly the best height growth and (*b*) significantly the worst survival. In respect of survival there were no significant differences among the rest.

232.4. Formation of Stands by Planting

See also No. 1885.

232.41. Planting Stock (Type, Handling and Treatment)

See also Nos. 1338, 1491.

1527. PERERA, S. P. ***Swietenia macrophylla* (Broadleaved or Honduras Mahogany) and its propagation by striplings [in Ceylon].** *Ceylon For.* (*n.s.*) 2 (2), 1955 (75–9). 8 refs.

Direct sowing, basket plants 8–10 in. high, transplants 12 in. high, stump plants and stem and branch cuttings were all tried, but only direct sowing and basket plants gave good results. These were, however, soon smothered by weeds. Striplings (4½–5 ft. high) gave 85% survival, and successfully competed with weeds.

1528. **Artificial regeneration [: effect of type of planting stock and season of planting, on survival].** *For. Res. India Burma 1950–51, Pt. I*, 1955 (22–35).

Reports on a number of experiments on winter planting and use of split stumps, for *Lagerstroemia flos-reginae, Trewia nudiflora, Cinnamomum camphora, Bischofia javanica, Broussonetia papyrifera, Dalbergia sissoo, Cedrela toona, Tectona grandis, Anogeissus pendula* and *Eugenia jambolana.*

1529. ALLEN, R. M. **Foliage treatments improve survival of Longleaf Pine plantings.** *J. For.* 53 (10), 1955 (724–7). 5 refs.

Recommends the clipping of planting-stock foliage to 5 in. near the time of lifting. Wax foliage coatings (in this case Dowax, a compound of paraffin wax, bentonite, and NH_4 linoleate) require further trials. Reducing the storage period increases field survival.

1530. AHOLA, V. K. Istutus keväällä taimimaasta syksyllä nostetuilla taimilla. **[Forest planting in the spring with seedlings taken from the nursery in the autumn.]** *Metsät. Aikak.* 1955 (9), (301–2). [Fi.e.]

Describes practical experiments carried out in Sweden and in Finnish State forests with seedlings taken up in autumn and carried to the planting-out site in winter Reports on storage in the forest, e.g. burial in the snow [cf. *For. Abstr.* 16 (No. 4043)]. Results are promising enough to justify continuing the work. The method offers advantages in N. Finland, in sparsely populated areas and in the management of large central nurseries. *From author's summary.*

1531. **Tree survival increases.** *Sth. Lumberm.* 191 (2389), 1955 (23).

Reports, *inter alia*, on tests by the Louisiana Forestry Commission on cold storage of Loblolly and Slash Pine. Survival of Loblolly put into commercial cold storage in January and planted out in March was 78–86% in September. That of Slash Pine was only about 60% for seedlings stored for 2, and less than 50% for those kept frozen for 3 months.

232.42. Methods of Planting (including Use of Fertilizers etc.)

See also No. 1336.

1532. **Ransomes Vibro Hoe. James planting tumbril.** *Equipm. Note, FAO* No. *A.*5.54, 1954. pp.1.

The motor hoe (Ransomes, Ipswich) is designed for weeding in forest nurseries. The planting tumbril consists of two large iron wheels (diam. 1·85 m.) which can be ballasted by loading a wooden box with stones. The rims are fitted with removable spuds that can be set in different positions and give different spacing of planting holes. The tumbril can be drawn by a tractor and workers follow behind and plant seedlings in the holes.

1533. BARNES, R. L., and RALSTON, C. W. **The effect of colloidal phosphate on height growth of Slash Pine plantations.** *Res. Note Fla. Sch. For.* No. 1, 1953. pp. 2.

Colloidal phosphate applied to *Pinus elliottii* at the time of planting, at rates of 1–4 tablespoons/plant, produced no significant increase in height growth. Applications at ½–1 ton/acre broadcast and disked or not disked, or applied in strips and disked or not disked, all produced significant increases. Remeasurement was done at 6 years.

232.43. Spacing and Arrangement in Plantations

1534. WHITE, S. B. **Interim survival study on plantations—Prince and Jarvis Locations.** *Res. Note For. Lib. Nthwest. Ont.* No. 2, 1955. pp. 2.

Survey of 3-year-old plantations of *Picea glauca* and *P. mariana* in N.W. Ontario showed a total mortality of ca. 20%, the two main causes being smothering by grass and over-deep planting. In the circumstances, 6 × 6 ft. planting would give adequate stocking, while 8 × 8 ft. would not.

1535. AREND, J. L. **Development of closely spaced Red Pine, White Pine and Norway Spruce after 40 years.** *Tech. Note Lake St. For. Exp. Sta.* No. 439, 1955. pp. 1.

Measurements on unthinned Red Pine, White Pine and Norway Spruce, 41 years after planting out at about 0·5 × 2·5 ft., showed that growth of the two Pines had been similar and that of Spruce rather less. Self-pruning has not been very effective. Damage to Spruce by rabbits was severe.

1536. PIERLOT, R. Le reboisement en placeaux espacés. **[Reforestation in spaced groups.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 4 (5), 1955 (325–38). 6 refs. [F.]

An illustrated account of early experiences of planting in dense groups (13–37 stems, 0·5–1 m. apart) spaced 4–10 m. as advocated by Anderson [cf. *For. Abstr.* 15 (No. 241)]. Species used in Kivu and Ruanda are *Eucalyptus saligna*, *Cupressus lusitanica*, *Pinus radiata*, *P. caribaea*, *P. patula*, *Maesopsis eminii*, and *Grevillea robusta*. Relative costs are given.

232.44. Season and Time of Planting

See No. 1528.

233. Afforestation

See also Nos. 1125, 1129, 1152, 1177, 1181, 1390, 1524, 1563, 2324.

1537. DUGELAY, A. Le complexe des reboisements en pays méditerranéens. **[The problem of afforestation in Mediterranean countries.]** *Rev. for. franç.* 7 (12), 1955 (868–81 + 6 photos). [F.]

A general review of the difficulties involved and the techniques that have been evolved to deal with them.

1538. CARMANTRAND, DE. Le Mont Ventoux. **[Mont Ventoux.]** *Bull. Soc. for. Franche-Comté* 28 (7), 1955 (345–62 + 4 photos). [F.]

An account of the afforestation of this mountain which, at the beginning of the 19th century, had been almost completely deforested. Afforestation began in 1888 and was completed in 1936.

1539. MAZEK-FIALLA, K. Verfahren und Erfolge bei Aufforstungen im Flachland. **[Afforestation methods and results in the plains.]** *Öst. Vjschr. Forstw.* 96 (1), 1955 (1–30). 9 refs. [G.]

An illustrated account of methods and equipment (chiefly mechanical, for soil preparation and fertilizing), planting and early tending, based chiefly on German and Austrian experience, with special reference to the poor soils and difficult climates of the East Austrian plain. Some Austrian equipment, e.g. the miniature tractors Winzerknecht (caterpillar) and Varimot (wheeled) used for hoeing, is illustrated.

1540. KERKÁPOLY, G. A Szeged-környéki homokfásítás története és tanulságai. **[The history and lessons of sand afforestation in the Szeged region.]** *Erdö* 3 (12), 1954 (433–8). [Hu.]

Changing trends in sand afforestation since the first attempt early in the 19th century are briefly reviewed. Experience has confirmed the superiority of Robinia over other species on fertile and medium sands. Poor sands are preferably planted with Austrian and Scots Pine and/or White and Grey Poplar. Oak, *Celtis*, Elm, Birch, Alder and Ash are suitable species for group planting according to soil conditions, while a number of shrubs including the native Elder and Hawthorn and the foreign "Saxaul" [*Haloxylon* sp.], will grow well on sites of low fertility. Establishment and survival of stands are promoted where sands are kept clear of a grass cover and supplied with farmyard or green manure.

1541. FILA, J. A homoki fenyötelepitések kérdéséhez. **[The problem of planting conifers on sand.]** *Erdö* 3 (8), 1954 (271–3). [Hu.]

Severe losses of conifer seedlings in calcareous sand may be due to damage by sand movement in spring, high soil temperatures (50–70° C.) and low atmospheric humidities (< 30%) during mid-summer, and desiccation of the topsoil to 2–4% moisture content. The harmful effects of these factors may be minimized by planting Scots and Austrian Pine in mixture with Poplar in soil carrying Bokhara clover. About 8–10 kg./ha. clover seeds are [broadcast?] sown in autumn on land ploughed to 30–35 cm. and rolled in the spring. The Poplar is planted simultaneously and the conifers in the following spring, when the Bokhara clover is thinned to leave clumps 30–40 cm. apart. These rapidly spread by self-sowing and provide a suitable soil cover; on less calcareous sands white lupin performs a similar function.

1542. TURY, E. Különbözö típusú szikes talajok kocsányostölgy állományai. **[Oak stands on *szik* soils of different types.]** *Erdész. Kutatás., Budapest* No. 1, 1954 (26–44). 4 refs. [Hu.hu.russ. e.g.]

The author briefly reviews available data on *szik* soils with particular reference to their bearing on Oak (*Quercus robur*) stands in Hungary and describes the growth to be expected on the various sub-types. Planted Oak reached biological maturity in 15–20 years (increment declining and seed-bearing starting, generally without any marked mast years) and should be cut at 35–60 years, depending on the alkalinity of the site. The importance of such early-yielding stands, especially as shelterbelts in otherwise rather treeless country, is stressed.

1543. TURY, E. A szikes talajok erdészeti osztályozása. **[Forest classification of *szik* soils.]** *Erdész. Kutatás., Budapest* No. 4, 1954 (3–12 + smries in suppl.). 8 refs. [Hu.e.g.russ.]

The limitations of current methods of classifying these soils (e.g. Magyar's phytocoenological approach

and 'Sigmond's chemical content) have led to many failures in afforestation. The author has developed by laboratory and field studies a method combining 'Sigmond's alkalinity determinations for both root zone and subsoil with other factors, whereby the tree crop best suited to each type of *szik* soil can be determined. [Cf. *For. Abstr.* 17 (No. 1552).]

1544. VITA, G. Il rimboschimento delle dune di 'Is Arenas'—Riola Sardo. **[The afforestation of the dunes of Is Arenas in Sardinia.]** *Monti e Boschi* 6 (10), 1955 (447–52). [It.f.e.]

Describes (with photographs) the work of the Corpo Forestale in stabilizing and planting an area of sand dunes 8 km. long and 2 km. wide, just north of Oristano on the W. coast of Sardinia. The area to be fixed was first covered with a network of wire and reed fences 5–10 m. apart, within which marram grass was planted with *Eucalyptus* spp. and *Acacia* spp. or sown with *Pinus pinaster* and *P. pinea*. Planting of *Pinus canariensis* was exceptionally successful.

1545. MACDONALD, J. **Notes on forestry in Sicily.** *Forestry* 28 (2), 1955 (81–93 + 3 photos).

An account of some aspects of the work being done by the regional government of Sicily in torrent control and afforestation.

1546. OECHSLIN, M., and OECHSLIN, K. Die Kirchberg-Lawinenverbauungen ob Andermatt, ein Beispiel einer Stützverbauung. **[The avalanche defence works at Kirchberg, Andermatt: an example of retaining works.]** *Schweiz. Z. Forstw.* 106 (2/3), 1955 (97–113 + 14 photos). [G.f.]

This dangerous avalanche area is now to be afforested as a safety measure. Planting has begun under the protection of defensive works (illustrated and costs given), in the form of dense groups. All plants were raised in a nursery at 1460 m. altitude from seed gathered at high altitudes.

1547. OHMASA, M. Expérience japonaise de plantations de protection. **[Japanese experience of planting for protective purposes.]** *Rev. int. Bois* 22 (210), 1955 (195 . . . 199). [F.]

Extract from a contribution to a forthcoming FAO Forest Development Paper on tree-planting practices in temperate Asia.

234. Formation of Forest by Natural Succession

1548. HORTON, K. W. **Early developments in a subalpine Lodgepole Pine stand of fire origin.** *Tech. Note For. Br. Can.* No. 16, 1955. pp. 6. 4 refs.

A study has been made of two permanent sample plots, representing good and bad sites in a stand of Lodgepole Pine established after fire in Alberta in 1936. Though of limited scope, the information provided has silvicultural applications, e.g. that the best sites should have priority in thinning, which should be carried out early to maintain maximum height increment. The Aspen on the slopes may be ignored, since it will disappear naturally through competition with the conifers. The proportion of Spruce (*Picea glauca*) in the understorey will continue to increase for many years after initial stand establishment.

235. Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth

See also Nos. 1387, 1412, 1414, 1541.

1549. BORSOS, Z. Átmeneti társulások a gyertyános-tölgyesek termöhelyén. **[Transitional associations on Hornbeam/Oak sites.]** *Erdö* 3 (12), 1954 (438–45). [Hu.]

The fast-growing Poplar seems a suitable interim choice for the production of valuable timber while Oak/Hornbeam stands are reaching full productivity. Underplanting 6- to 15-year-old stands with 'Canadian' Poplar will lead to an association that may be returned to Oak/Hornbeam after about 30 years or maintained by then renewing the Poplar. The productive capacity of the soil will be maintained by the Hornbeam, which regenerates itself by seed. The impoverishment caused by Robinia on soils suitable for Oak may be counteracted by underplanting it at 10–15 years with Hornbeam; the latter will suppress the Robinia in ca. 40 years, and before then should itself be undersown with Oak so as to create an Oak/Hornbeam stand. Robinia/Hornbeam stands may also be maintained on the better sites by replanting the Robinia every 20–25 years, the Hornbeam maintaining itself by seed.

1550. MAGYAR, P. Az akácKérdéshez. **[The Robinia problem.]** *Erdö* 4 (1), 1955 (18–25). 18 refs. [Hu.]

There is evidence that the beneficial effects of Austrian Pine on Robinia on poor calcareous sands are associated with its deeper root penetration (25–40 cm.), and with improved storage of soil moisture through shading, weed suppression, and accumulation of litter. Deteriorated stands on droughty calcareous sands (*Festuca vaginata/Stipa capillata*) and stands invaded by certain annual grasses (e.g. *Calamagrostis epigeios*, *Agropyron repens*, *Poa angustifolia*) or by weeds, may be regenerated by underplanting with Austrian Pine so as to reduce the Robinia to a proportion of 15–40%. The Robinia should be entirely replaced by Alder, Poplar and Austrian Pine on sites exposed to frost and by Oak on heavy clays.

1551. BABOS, I. A gyorsan növö fafajok telepítési lehtöségeinek növelése biológiai meliorálással. **[Extension of planting possibilities of fast-growing tree species by 'biological amelioration'.]** *Erdész. Kutatás., Budapest* 1954 (3), (47–72 + smries in suppl.) 14 refs. [Hu.e.g.russ.]

The author singles out, from experience in Hungary, the following instances of natural amelioration: (1) at the upper limits of tree growth, the lower branches of Spruce layer themselves into the ground, with all the appearance of seedling regeneration; Austrian Pine behaves similarly on poor sand dunes. (2) On dry sites, an admixture of deciduous tree species assists the decomposition of coniferous litter. (3) The roots of certain tree species penetrate unfavourable soil layers, e.g. pans, their eventual decay allowing other species to reach lower, moist horizons. The value of Scots Pine, and even more Austrian Pine, as pioneers of this sort for *Robinia pseudoacacia* on poor sandy soils is

particularly stressed, many instances being cited and illustrated. Robinia can only be established in the Alföld if mixed with conifers, in proportions varying with the site.

1552. Tóth, B. A sziki erdök alsó koronaszintjei. [**The forest understorey on *szik* soils.**] *Erdész. Kutatás., Budapest* 1954 (4), (13–25 + smries in suppl.) 6 refs. [Hu.e.g.russ.]

Despite the poverty of growth and species in such understoreys, which do not afford *szik* soils the protection they need, little research has been done to date on artificial supplementation. Experience shows, however, that stands of 2 or 3 storeys can be established, success depending on the concentration of Na salts and the local water economy, on the basis of which a classification of *szik* soils is developed. The species (tree and shrub) suitable for each are detailed. [Cf. *For. Abstr.* 17 (No. 1543).]

1553. Bellon, S. Podsiew jako jeden ze sposobów odnowienia dębu. [**Undersowing as one of the methods of Oak regeneration.**] *Las polski, Warszawa* 29 (1), 1955 (12–3). [Pol.] From *abstr.* in *Prehl. lesn. Lit.* 6 (7), 1955 (No. 2579). [Cz.] P.R.

Presents the results of introducing Oak into 80- to 90-year-old Scots Pine stands. Undersowing is feasible if there is no danger from mice and deer, and if the density of the Pine is $\leqslant 0{\cdot}7$. Oak may remain under shade up to 10 (average 5) years. Sowing should be in furrows hoed 0·5 m. apart, with acorns every 30 cm.

1554. [**Gallery forest enrichment.**] *Rapport et Bilans, Comité spécial du Katanga, Bruxelles 1954*, 1955 (65–83). [F.]

Contains notes on forest operations including the enrichment of gallery forest with *Chlorophora excelsa, Khaya nyasica, Canarium schweinfurthii, Ricinodendron africanum* and *Terminalia superba.*

236. Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)

See also Nos. 1525, 1539, 1713, 1718.

1555. [**Relations between time of first hoeing, weed density, weeding cost and early seedling growth in Black Wattle.**] *Rep. Wattle Res. Inst. S. Afr. 1954/55*, 1955 (15–6).

The weeding operations were: all weed-growth hoed (*a*) 5 months and (*b*) 3 weeks before felling the 8-year stand, and (*c*) clean-hoeing 4 months after felling. The treatments (labour units/acre in brackets) were $a + c$ (8); $b + c$ (9) and c alone (8). All plots were drill sown, close to the tree rows, just before felling, and thinned to 3 ft. after *c*. Two months before this hoeing, the then unhoed plots carried 12·42% weed cover—significantly more than those of the *a* and *b* hoeings, between which the difference was not significant. Similar significance and lack of it was found in the differences in seedling height growth at 8 months. Hoeing in the winter before and again after felling resulted in a 59% increase in seedling height as compared with that resulting from hoeing only after felling. Hoeing immediately before felling was equally beneficial but cost 12½% more.

1556. Sahay, B. K. **Sampling of natural regeneration [of Sal].** *Indian For.* 81 (12), 1955 (742–52). 11 refs.

The assessment of natural regeneration of Sal (*Shorea robusta*) by sampling is discussed. A number of sampling patterns under sampling intensities of 10 and 20% have been constructed, and the derived statistics tested against actual deviations. A sampling intensity of 20% is indicated for unestablished Sal regeneration in sample plots of 0·1 acre, 10% for sampling units of 2·4 acres, and even lower intensity for larger areas. *From author's summary.*

1557. Bever, D. N., and Lavender, D. P. **Revised 'number of trees per acre' curves.** *Res. Note Ore. Bd. For.* No. 25, 1955. pp. 3.

[Cf. *For. Abstr.* 14 (No. 1195).] The curves can be used to convert % of stocking to number of trees/acre for either milliacre or 4-milliacre %s.

237. Amelioration of Forest Sites

See also Nos. 1164, 1331, 1551, 1817.

1558. Pohl, Z. Wpływ odwodnienia łęgów nadobrzańskich na rozwój sąsiadujących z nimi drzewostanów sosnowych. [**Draining of the low-lying meadows along the Obra and its effect on the development of neighbouring Pine stands.**] *Ekologia Polska, Warszawa* 2 (2), 1954 (165–202). 18 refs. [Pol.russ.g.] BL.U.

The 120-year Pines, standing in loose, dry sand on slightly rolling ground rising to 14 m. above the level of the drained meadows, were about 40 years old at the time the drainage scheme was completed. Annual precipitation is only 507 mm. Where the ground-water level, formerly within the reach of the roots, had fallen by 1 to 2 m., site quality was reduced by 1 to 1·5 quality classes (Schwappach). The effect diminished with distance from the drainage canal and with height above groundwater level, disappearing where that level (after drainage) was 5 to 7 m. below the surface.

1559. Tamm, C. O. Om gödsling av skogsmark. [**The use of fertilizers on forest soils.**] *Svenska SkogsvFören. Tidskr.* 52 (3; 4), 1954 (263–86; 317–30). 33 refs. [Sw.]

Describes briefly some experiments seen on a tour in Denmark, Switzerland and Germany and their results. Discusses the problem of soil degeneration (in the humus and deeper layers) under conifers, summarizing German conclusions on the need for improvement of (*a*) the humus, e.g. by removing raw humus, using an admixture of soil-improving tree species, or liming, and (*b*) naturally poor soils, by liming and growing leguminous crops. These conclusions are considered in relation to conditions in Sweden.

1560. Hausser, K., and Schairer, E. Ergebnisse von Forstdüngungs- und Meliorations-Versuchen in Süd-Württemberg. [**Results of fertilizing and amelioration trials in South Württemberg forests.**]

Mitt. württemb. forstl. VersAnst. 10 (1), 1953 (3–109). 33 refs. [G.]

An account of long-term trials (*A*) on two flat, badly drained sites on old moraine with very fine loam (*Staublehm*) in Upper Swabia, which had been degraded and denuded of bases as a result of pure Spruce rotations with clear fellings, stump clearing and intermittent agricultural use, and carried chiefly stunted 45-year Spruce 1·50–6 m. high, with a ground cover of moss; and (*B*) on a stony, shady site, poor in nutrients, such as is often found on S. and W. slopes in the bunter sandstone region of the Württemberg Black Forest. The first author deals with effects on yield, the second with those on soil. Treatments on (*A*), begun in 1929, included fertilizing with lime in varying quantities and forms, twig mulching with and without lime, moss removal, draining, and complete fertilizing (with mixed CaO, $CaCO_3$, $Ca(NO_3)_2$, basic slag and K salts). Best growth results were obtained on the first (*A*) site (at very high cost) by twig mulching, on the second by complete fertilizer followed by twig mulching and heavy liming. Draining gave little or no improvement, and moss removal proved harmful on both sites. In two experiments on (*B*) sites, various combinations of fertilizers (including lupins) were tried on Spruce and Japanese Larch plantings. In one set of plots the raw humus was removed from an area of 1 sq. m., composted with 1·5 kg. CaO and soil in a hole about 40cm. deep, then heaped and planted with 4-year transplants. Full fertilizing showed best results with Spruce, except that the compost series, which had received great quantities of CaO, was superior throughout to the best plots of the other series. The effect of lupins was not significant. Larch growth was at first best on the compost series, but at 18 years differences were no longer marked. Total yield was very much greater for Larch than for Spruce, but the Larches suffered badly from snow and wind in 1949–50. One experiment showed that twig mulching, with or without added CaO, improved the height growth of Silver Fir under a Pine stand, and that burning of litter, or its removal, even with lime and basic slag added, was unsatisfactory. Finally, observations on two amelioration trials started at the turn of the century, chiefly among stunted stands of Pine and Spruce, showed that the effect of fertilizers, particularly basic slag, was still noticeable. Soil analysis showed that even small additions of Ca could be detected after a number of years, through the change of humus colour from reddish-brown to greyish-black. The thickness of the layer of raw humus was not, however, much affected. Where liming had been heavy, its effects could be noticed analytically down to a depth of about 25 cm. (A_3G horizon). Soil-fauna populations were greatly reduced by heavy liming, particularly where great quantities of CaO had been used, and had not fully recovered after 20 years. Twig mulching did not reduce acidity. Its good effect on growth is attributed chiefly to an increase in phosphates and NH_4. The harmful effect of removing moss is attributed chiefly to a loss of available P and N, a disturbance of the water balance, and a reduction of the soil fauna.

1561. RIECKERT, W. Abfluss- und Sorptionsmessungen an Buntsandstein-Böden. **[Drainage-water analyses and sorption tests on bunter sandstone soils.]** *Mitt. württemb. forstl. VersAnst.* 10 (1), 1953 (110–20). 13 refs. [G.]

Chiefly an investigation into the effect of liming on 'weisser Klebsand' from the district of Hirsau, Württemberg, by electrolytical analysis of water from boreholes on limed and unlimed plots, complemented by sorption tests in which similar soils were brought into contact with naturally calcareous water. Since it was shown that the soil is capable of adsorbing Ca in considerable quantity and that little leaching occurs, liming is recommended as a means of helping the checked Pines on this type of soil.

1562. HELLMERS, H., BONNER, J. F., and KELLEHER, J. M. **Soil fertility: a watershed management problem in the San Gabriel mountains of southern California.** *Soil Sci.* 80 (3), 1955 (189–97). 13 refs.

Pot and field trials made to test the reactions of 5 chaparral species, including *Pinus coulteri*, *Pseudotsuga macrocarpa* and *Quercus chrysolepis*, on 3 local soil types, when N, P, K, Ca, and 5 minor elements are added, indicate the possibility of interrupting the sparse-cover, rapid-erosion cycle by increasing the fertility of the soil. N was here particularly effective. The intake of P is probably limited by critically low rainfall. Tables show the weight of total shoot growth of seedlings raised in pots and the weights of the longest terminal shoots in the field plots under these treatments.

1563. LEYTON, L. **The influence of heather mulching on the growth and nutrient status of Lawson Cypress.** *Forestry* 28 (2), 1955 (147–51). 6 refs.

The application of a heather mulch in a heathland plantation of *Chamæcyparis lawsoniana* has, over a period of 8 years, more than doubled the height of the trees compared with untreated controls. Analysis of the current foliage of trees from mulched and control plots reveals considerably higher concentrations of N and P in the former, indicating an increase in the availability of these nutrients to the trees, presumably from decomposition of the mulching material and the suppression of the competing heather vegetation. Much of the beneficial influence of the mulch must, however, be attributed primarily to better moisture conditions, particularly during dry periods when the superficial roots of the trees are otherwise liable to desiccation. *Author's summary.*

238. Timber Plantation Crops requiring Special Treatment

1564. **Home grown Poplar for matches and baskets.** Bryant and May Ltd., London. 1955. pp. 14.

A pamphlet setting out the rudiments of Poplar growing, together with its financial aspects, with a view to meeting the needs of match and basket manufacturers in Great Britain.

24. Tending of Stands and Trees

See also No. 1220.

1565. POLANSKÝ, B. Za lepší výchovu lesních porostů. **[Better tending of forest stands.]** *Lesn. Knihovna (malá Řada)* No. 51, 1954. pp. 118 + [1]. [Cz.] Price *Kčs.*13·20.

Describes the main principles of tending operations (cleaning, thinning, opening of the canopy). In the second part, some results are presented of thinning experiments conducted in Czechoslovakia since 1886 in different stands and using different thinning methods.

241. Cleaning

See also No. 1713.

1566. CHURCH, T. W., JR. **Weeding—an effective treatment for stimulating growth of northern hardwoods.** *J. For.* 53 (10), 1955 (717–9). 6 refs.

Reports further results of the 1936 experiment [cf. *For. Abstr.* 6, p. 23] and gives recommendations on selection, spacing and clearing, in favour of desirable crop trees of *Prunus serotina* and *Acer saccharum.*

242. Thinnings

See also Nos. 1628, 1914–5.

1567. MORAIS, R. **Thinning Balsam Fir thickets.** *Res. Note Causapscal For. Res. Sta.* No. 6, 1955. pp. 4.

An experiment was made in different methods of thinning dense young stands of Balsam Fir (averaging 7290/acre and 1·25 in. d.b.h. in one stand, and 4675/acre and 1·83 in. in the other). The methods tested were: (1) thinning to ca. 4 ft. spacing by cutting unwanted trees with an axe at ground level and pushing them over; (2) same spacing, but trying to kill trees by a single blow of the axe at the most convenient height, which turned out to be 3 ft. from ground level; (3) as (2) but using the Sandvik 'bush knife' (illustrated) instead of an axe; (4) crushing the trees in strips 6 ft. wide by the use of a D-4 caterpillar tractor without the dozer blade, leaving untouched strips 4 ft. wide; and (5) as (4) but with strips 12 ft. apart and a second set of strips run at right angles to them. The comparative costs of the different methods are given, and the difficulties encountered are described. Preliminary indications are that thinning stands of this age class is an expensive operation, only likely to be economically feasible for small landowners.

1568. MØLLER, C. M. Tyndingens indflydelse på massetilvæksten. **[The effect of thinning on volume increment.]** *Svenska SkogsvFören. Tidskr.* 50 (4), 1952 (319–42); 51 (1), 1953 (1–14). 57 refs. [Dan.]

Outlines Danish research for 1933–53, and other European research for 1935–51, and summarizes the results (mainly for Beech and Norway Spruce on good moraine sites). Discusses the effect of thinning grade on such factors as wind, soil minerals, light and warmth, and water, and concludes that any such effect will have no long-term influence on volume increment. Also discusses more briefly the effect of thinning on respiration and assimilation, depth of water-table, and transpiration.

1569. SCHREIBER, M. Massenmässige Ertragssteigerung durch Waldpflege. **[Increasing volume yields by tending operations.]** *Zbl. ges. Forstw.* 74 (1), 1955 (1–18). 49 refs. [G.]

Chiefly a discussion of recent work on the effects of thinning, mainly for Spruce and Beech (from literature in German) and its applications under Austrian conditions.

1570. BOGGESS, W. R., and MCMILLAN, F. W. **Growth and yield from a second row-thinning in an 18-year-old Shortleaf Pine plantation in Southern Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 62, 1955. pp. 4. 4 refs.

[Cf. *For. Abstr.* 13 (No. 1203).] Every 4th row was removed in 1951, and the middle one of each 3 rows in 1954. The present report covers yields from the 2nd thinning, grade of trees left, growth during 4 years since 1st thinning, and response to thinning compared with that in a crown thinning of equal intensity (in favour of the latter).

1571. WILSON, F. G. **Evaluation of three thinnings at Star Lake.** *For. Sci.* 1 (3), 1955 (227–31). 7 refs.

Gives a summary of yield-table data for two matched 1-acre plots of *Pinus resinosa*, one not thinned, the other thinned at years 30, 35, and 41 so as to maintain an average spacing of ca. 20·6% of the mean height of the contemporary dominants. Data include the density thus stated and bole area. The formula relating trees/acre to stand height [see *For. Abstr.* 8 (No. 2812)] is now regarded as theoretical and the author withdraws the references there made to normality. It is used here to provide a diagonal grid on logarithmic paper of the 5, 10, . . . 30% lines on a graph of trees/acre against stand height. On this the effects of the three thinnings are compared with the residual stands of Scots Pine growing on a similar site in Germany (both having an index of 65 at 50 years); the Scots Pine is under accretion thinning (*Lichtung*). The effect of one of Craib's thinnings in *P. radiata* [cf. *For. Abstr.* 1 (p. 165)] is also inserted. This comparison of similar thinnings of 3 hard Pines in 3 continents is possible because 'height has the virtue of combining the components of age and site in one measurement.' The reaction of basal area, the use of the bole-area check [cf. Lexen, *For. Abstr.* 5 (p. 287)], stand density and volume increment, and financial results from thinning are discussed, with graphs.

1572. STEELE, R. W. **Thinning nine-year-old [natural] Douglas Fir by spacing and dominance methods.** *Northw. Sci.* 29 (2), 1955 (84–9). 1 ref. L.S.

Thinning to ca. 8 × 8 ft. spacing, either mechanically (*a*), or by leaving the nearest dominants (*b*), had little effect on cubic volume, but gave increased height, basal area, and board-foot volume, with a slight superiority of plot (*a*), which however, lags behind (*b*) in volume c.a.i.

1573. CUTTEN, E. Y. **Some preliminary growth and yield data for thinned *Pseudotsuga taxifolia* in Kaingaroa Forest.** *N.Z. J. For.* 7 (1), 1954 (1955), (75–8 + 16 tbls.).

Examination of the data from 4 permanent sample plots first thinned (2 grades) at 21–26 years old, showed no marked response to thinning and no increase in production in the next 6 years. Increment in the thinned plots, however, is now concentrated on larger and better formed stems and there is thus an improvement in stand quality.

1574. GEORGOPOULOS, A. Erste Ergebnisse eines Durchforstungsversuches bei der Pappel. [**First results of a thinning study on Poplar.**] *Schweiz. Z. Forstw.* 106 (5), 1955 (273–86). [G.f.]

Sample plots of two very dense stands of Poplar (probably *P. deltoides* var. *monilifera*) were thinned at about 10 years old and remeasured two years later. Mensurational data are given. The residual stands reacted very favourably. Thinnings should be made early and often, the last taking place before the trees have finished their height growth (20–30 years).

1575. [**Thinning of *Acacia decurrens* var. *mollissima*.**] *Rep. Wattle Res. Inst. S. Afr. 1954/55*, 1955 (14).

Plots of 2½, 3, 4 and 6 years, at densities respectively of > 1000, 750, 550 and 600 stems/acre were all significantly suppressed in comparison with plots grown respectively at 660, 600, 400 and 400. The first two series were grown on the same estate, the other two in different districts. [Cf. *For. Abstr.* 16 (No. 3008).]

243. Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)

See also Nos. 1434, 1718.

1576. HOMBERT, J. Empoisonnement des arbres à l'aide de l'arsénite de soude. [**Tree poisoning with sodium arsenite.**] *Bull. Inform. Inst. nat. Étude agron. Congo belge* 3 (4), 1954 (245–60). [F.]

[Cf. *For. Abstr.* 15 (No. 1360).] Seventeen Mayumbe species resistant to simple girdling are classed as (*a*) strongly callusing, (*b*) not dying or only dying slowly, whether callusing or not, (*c*) difficult to girdle owing to buttresses. The two commonest of each class were tested with Na arsenite. Dosages of 20, 40 and 60 g./m. circumference are insufficient to kill large trees. Concentrated solutions or powder (saving in water and size of hole), in inclined holes bored ≮ 20 cm. apart, are recommended for small trees. For large trees of class (*a*), double girdling alone is best.

1577. TASSINARI, M. M. L'avvelenamento dell' *Hevea* nel 'replanting'. [**Poisoning *Hevea* preparatory to replanting.**] *Riv. Agric. subtrop. trop. Firenze* 49 (7/9), 1955 (257–9). [It.] E.M.B.

Describes the methods employed in Malaya to clear old Rubber plantations by poisoning the existing trees. Application of 2,4,5-T to a ring girdle has proved very effective. The disadvantage of this method is that a reservoir of fungal infection remains and infects the young crop, notably with *Fomes* spp. and *Ganoderma* spp.

245. Tending of Trees, Pruning etc.

See also Nos. 1349, 2187.

1578. NYLINDER, P. Kvistningsundersökningar. I. Grönkvistning av ek. [**Pruning investigations. I. Green pruning of Oak.**] *Medd. SkogsforsknInst., Stockh.* 45 (12), 1955. pp. 44. 12 refs. [Sw.sw.e.] Price *Kr.*2.

A study of pruning results was made on 64 trees (a total of 499 branches pruned) in 7 Crown forests in S. Sweden. (1) The time elapsing before complete healing increased with decreasing annual ring width and increasing stub length, and these were found to be the primary factors affecting it. A positive relationship was also found between branch diameter and stub length, and a nomogram is presented for calculating the complete healing period from ring width and branch diameter. After normal pruning, complete healing should take 4–8 years. (2) Stub healing is more rapid from the side than from top and bottom. The period of healing increases with decreasing annual-ring width, and increasing stub length and damage during pruning. (3) Stub length can be expressed as a function of age of branch, of stub diameter and of thickness of bark. Variations in these relationships between one site and another are attributed to the variations in pruning technique, in particular to pruning tools. (4) A weak but statistically significant correlation was found between radial width of the plug of bark forming over the knot and the years elapsing before complete healing. The greatest importance of this plug of bark is in its effect on the delay occurring before clear wood appears over the pruned branch. (5) A nomogram is presented for calculating the amount of radial growth needed before clear wood is produced, from stub diameter, annual ring breadth and bark thickness. (6) Neither rot nor discoloration was found to have spread beyond the annual ring of the pruning year. A certain relationship was found between the degree of rot or discoloration (expressed in index values 1–8 ranging from slight discoloration to very severe rot damage) and branch diameter, stem damage during pruning and years for complete healing. In general, risk of rot damage to Oak after pruning is slight. (7) Although no thorough enquiry has been made, summer pruning appears to give the best results. A diagram is given illustrating the various terms (e.g. stub, plug of bark, period of stub and complete healing) used. All illustrations, graphs and tables have English legends.

1579. [**Bud pruning of *Pinus longifolia*.**] *For. Res. India Burma 1950–51, Pt. I*, 1955 (36–8).

Bud pruning was done in Jan. 1950 and Jan. 1951 (epicormics being removed in April, May, and Nov. 1950). Measurements made in July 1950 and Jan. 1951 showed no significant difference in height between bud-pruned and control trees, or between these and the repeatedly disbudded trees.

1580. BROWNBACK, H. L. **Tree wound dressing.** *U.S. Patent* No. 2,709,871, June 7, 1955. pp. 2. 17 refs. P.O.

Blown oil (e.g. castor oil) containing ca. 1% of a polymerization inhibitor and a filler (e.g. asbestos fibre, ground cork, sawdust), is applied as a coating.

25. Treatment of Defective, Derelict or Very Open Stands

See No. 1390.

26. Combinations of Forestry with Agriculture and Pastoral Husbandry (Including Shelterbelts and Their Treatment)

261. Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land

See also Nos. 2335, 2337.

1581. ALLSOP, F. **Shifting cultivation in Burma: its practice, effects, and control, and its use to make forest plantations.** New Zealand Forest Service, Wellington, N.Z. [*n.d.*] pp. 9.

Includes an account of *taungya*.

262. Fuel and Fodder Forests

1582. **[*Acacia cyanophylla* as a forage species.]** *Rep. For. Dep. Cyprus 1954*, 1955 (66).

Investigation of the suitability of *A. cyanophylla* as a fodder plant continued, seed being fed to poultry and livestock. The results of the poultry trial were not encouraging. The tests carried out with sheep lasted for 5 months, during which time it was found possible to build up the *Acacia* seed (fed crushed) to 95% of the total ration without any ill effects. There was no apparent difference in fodder value between *Vicia sativa* and *Acacia* seed. It was found that the average *Acacia* bush could be expected to produce 2–3 lb. of seed per annum, and production from 1 donum (0·33 acre) of average *Acacia* plantation could be expected to vary between 16 and 20 lb. Regrowth from established *A. cyanophylla* bushes that have been newly coppiced can be completely grazed off in the autumn months without harming the plants.

264. Farm Forests

1583. ANDERSON, R. H. **Trees on the farm.** *Farmers' Bulletin, Department of Agriculture, New South Wales* No. 167 (4th ed. rev.) 1952. pp. 72. Price 3*s*.

Choice of species, nursery practice, silviculture etc., for shelterbelts and farm woodland in New South Wales.

265. Strips or Lines at Road, Rail and Canal Sides, etc.; Hedgerow Trees

1584. RASCHKE, M. Flurholzanbau als Windschutz und zur Holzversorgung. **[Timber growing outside the forest for wind protection and wood production.]** *Forst- u. Holzw.* 9 (24), 1954 (503–4). [G.]

A report on the 1954 conference of the Lignikultur Society, dealing chiefly with Poplars, and describing a planting scheme in Schleswig-Holstein, carried out by a wood-using industrial firm on land owned by local authorities, private individuals etc. The firm, through its skilled staff, does all the planting and tending, and in return receives ¾ of the eventual proceeds. Also describes a shelterbelt system in the Geest region, designed by Iwersen and Rohmeder, where ca. 80 km. of tree rows, supplemented by 180 km. of hedges, have been planted since 1950 to protect an area of ca. 2000 ha.

1585. BRODBECK, C. Nutzholzproduktion ausserhalb des Waldes. **[Timber production outside the forest.]** *Schweiz. Z. Forstw.* 106 (12), 1955 (705–12). [G.f.]

Gives some statistics for production in Switzerland, and makes suggestions for increasing it by a sparse growth of Larch in mountain pastures, irrigated plantations, shelterbelts, and planting along roads and river banks.

266. Shelterbelts, Windbreaks

See also Nos. 1148, 1326, 1583–5, 2324.

1586. DIRMHIRN, I. Zur Strahlungsverminderung an Windschutzstreifen. **[On the reduction of radiation near shelterbelts.]** *Wetter und Leben, Wien* 5 (11/12), 1953 (208–13). 11 refs. [G.] L.S.

A theoretical calculation of losses in total radiation (i.e. direct insolation and sky radiation) near hypothetical close shelterbelts of even height running in straight lines either in a N.–S., E.–W., N.E.–S.W. or N.W.–S.E. direction, expressed in relation to their height and based on the meteorological conditions of the Vienna region (48° lat.).

1587. SHIOTANI, M., and ARAI, H. **Snowdrift control by shelterbelts.** *Abstr.* in *Trans. Amer. geophys. Union* 36 (3), 1955 (528). H.S.B.

The controlling effects were investigated of height, breadth, height to crown base, and density of the shelterbelt. In addition to wind-tunnel work, field experiments were undertaken on two different shelterbelts, one a snowstorm protection belt of the Japanese National Railways, the other an artificial forest stand. Results are expressed in terms of decrease in wind velocity, both in the windward and the vertical direction, total deposit of snow, accumulation of snow after a snowstorm and drifting snow both inside and round the forest. The authors further discuss the safety from snowdrifts of the road and railway to leeward of the shelterbelt.

1588. JOACHIM, H. F. Beispiele erfolgreichen Pappelanbaues in der Feldflur und Untersuchungen über die Einwirkung von Pappelanpflanzungen auf benachbarte Kulturen. **[Examples of the successful use of Poplars [to give shelter] in cultivated lands and research on the effect of planting Poplars on neighbouring crops.]** *Holzzucht, Lignikultur* 9 (2), 1955 (9–10). [G.]

An examination of crops in fields bordered by roadside plantings of Poplar near Eberswalde showed that while yields of summer crops (e.g. spring wheat, and potatoes) were affected by shading and root competition, winter rye did not suffer. Yields suffered greater reduction on poor than on good soils. Analyses showed that the leaf-fall from Poplars increased the nutrient content of the soil. Root competition can be reduced by

digging and maintaining trenches parallel with the tree rows; deep ploughing encourages the formation of adventitious roots. Measurements in Spreewald and Appelstädt, Kreis Gotha, showed that, in years of late frosts or of spring drought, hay crops were heavier in areas sheltered by rows of Poplar and Alder.

1589. STAPLE, W. J., and LEHANE, J. J. **The influence of field shelterbelts on wind velocity, evaporation, soil moisture and crop yield.** *Canad. J. agric. Sci.* 35 (5), 1955 (440–53). 9 refs. O.R.E.

Reports on measurements taken during the years 1950–54 at the Soil Research Laboratory, Swift Current, in connexion with the extensive shelterbelt projects started in 1935 near Conquest and Anerwick, Sask., and Lyleton, Man., with the help of the Forest Nursery Station, Indian Head, having to date a combined length > 1000 miles. Belts were either single-row hedges, chiefly Caragana, 7–9 feet high, or composed of 2 to 3 rows, chiefly of Caragana, Ash and Maple, 20–25 ft. high. Velocities of winds at right angles to the belts were reduced for a distance of at least 20 times belt-height. Hedges sited at intervals of 27–40 rods had no cumulative effect. Reduction in evaporation was small and probably without effect on crop yields. It is probable that soil drifting—not severe in the years in question—was reduced in some places. Snow accumulation varied from nil to 70-ft.-wide drifts. The increased soil moisture available when crops were sown resulted in greater yields, which reached their peak about 15–20 feet from the belts. Root competition was not marked. The net crop increase in one group of sheltered fields, taking into account the area occupied by the belts, averaged 0·7 bushels/acre. [Cf. *For. Abstr.* 10 (No. 2519).]

1590. KALAŠNIKOV, A. F. Položiteljnoe vlijanie lesnyh polos na vlažnostj predkavkazskih černozemov v teplyĭ period goda. **[The favourable influence of shelterbelts on the moisture of Cis-Caucasian chernozems during the warm season.]** *Počvoved.* 1955 (6), (74–82). 5 refs. [Russ.] A.P.B.

Details the results of a study of two shelterbelts on the 'Gigant' collective grain farm, Sal'sk district, Rostov province, under conditions of uniform relief and soil: (1) an impermeable, 11-year-old, *Gleditsia*/Ash belt of 10 rows, 16·5 m. wide and 5–5·5 m. in height; and (2) a permeable, 9-year Robinia/Ash belt of 7 rows, 12 m. wide and 5·3–5·5 m. high. Soil moisture determinations were made at various distances up to 230 m. on the lee (W.) and windward (E.) sides, and also at 500 m., i.e. beyond the zone of influence, starting in Oct. 1948 and repeated in March, July and Nov. 1949 and in April 1950. The period was drier than average, even for this dry region, which has little snow in winter and long summer droughts with E. or S.E. winds and dust storms. Wilting coefficients were also determined for the calculation of 'productive' soil moisture as the difference between total soil moisture and that at wilting point. Moisture determinations were made at various depths down to 150–200, or sometimes 285–290 cm. Data are presented in tables and graphs showing that 'productive' soil moisture decreases fairly regularly with increasing distance from the belt, with considerably higher moisture values for the protected zones to the leeward. The fact that no snow fell in 1947–48, and little in 1948–49, is evidence that the effect is due to reduction of evaporation and transpiration. Data are also included on yields of winter wheat to show that within the protected zone they are closely correlated with 'productive' soil moisture. It is noted that protection from the belts appears to favour efficient water use by the crop plant, since in some instances, e.g. in 1950, wheat outside the protected zone had only ca. ½ the yield of that at 100 m. from a belt, in spite of practically equivalent soil moisture supplies at the start of the growth period. An index of the efficiency of water use is calculated by dividing crop yield (kg./ha.) by 'productive' soil moisture (cu.m./ha.) at the start of the warm season. Tabulated values of this index show that the zone of effective influence to the lee of the belts was 150 m. wide for (1) and a little wider for (2), i.e. ca. 25–30 times the height of the belts. The permeable structure of (2) appears to be responsible for a more gradual decline of the index with increasing distance from the belt, the figures for (1) showing more abrupt changes.

1591. VADJUNINA, A. F., and MRAMORNOVA, M. V. Vjaz melkolistnyĭ kak glavnaja poroda v polezaščitnyh polosah na svetlokaštanovyh počvah. **[*Ulmus parvifolia* as a main species in shelterbelts on light-chestnut soils.]** *Počvoved.* 1955 (6), (87–96). [Russ.] A.P.B.

In 1950–51, trial plots were established on the Ergeni Hills near Stalingrad to study techniques of raising shelterbelts, including choice of species. The present paper gives some results up to 1954 for *U. parvifolia* planted in mixture with Oak or *Caragana* on light-chestnut soils or sandy-loam (1), and heavy clay-loam (2) texture, and on a heavy clay-loam solonets (3). Tabulated data are given on soil permeability and moisture in excess of the wilting coefficient; height growth of the Elm and the ash composition of its leaves, stems and roots, and excavated root systems are illustrated in diagrams. This Elm is quick-growing, drought- and salt-resistant, and to be recommended for shelterbelts on light-chestnut soils. The suitability of the soils decreased in the order given. On (1) ca. 12% of the plants were > 3 m. high in 1954. The root system in (3) was superficial, ending abruptly at the zone where water-soluble salts increase; in (1) and (2) it was copiously ramified in the surface horizons and also developed many sinkers—most abundant in (2)—which used the lower soil horizons. This ability to exploit a large volume of soil is important for droughty regions. One established, the Elm improves the permeability of the soil, thus promoting the entry of water and the leaching out of harmful salts. The ash content of the leaves is 10–13%, with CaO, MgO, and SiO_2 as main components; leaves of plants on (3) showed lower contents of these components and of Fe_2O_3 and total ash, but higher Al_2O_3 and MnO contents. Some recommendations are made on planting practice.

1592. FEKETE, G. Védöerdöövezetek és mezövédö erdösávok telepítése a Bolgár Népköztársaságban. **[Planting of forest and field shelterbelts in the Bulgarian People's Republic.]** *Erdö* 3 (11), 1954 (410–3). [Hu.]

A further account [cf. *For. Abstr.* 17 (No. 436)]. On flat and gently sloping land, the soil is ploughed to 30–40 cm. depth, left fallow during the summer, and ploughed again before planting in spring or, occasionally, in autumn. Ploughing in strips 40–120 cm. wide is practised on more sloping ground, while planting in ditches 30–35 cm. deep spaced 1-m. apart is done on slopes $> 0{\cdot}5°$. Seedlings from State nurseries are planted mechanically or by hand, but species with large seeds are preferably sown direct. The belts are 20–300 m. wide, according to topography and purpose (river-bank protection, windbreaks, and snowbreaks etc.), comprising alternate rows carrying the principal tree species (25%), secondary species (25%) and shrubs alone or in mixture. The principal species generally used are: Oak, Ash, *Gleditsia*, Walnut, Poplar (for rapid growth) and *Celtis* (for eroded areas). Lime, Mullberry, Maple and various fruit trees are planted as secondary species. Shrubs include Privet, Spindle-tree, Dogwood, Hazel and Sallow. Companion crops (maize, potato, beet and melon) are cultivated whenever, and as long as, possible.

1593. READ, R. A. **Status of the Great Plains shelterbelts.** *Yale Forest School News, New Haven, Conn.* 43 (4), 1955 (67–74). [Rocky Mountain Forest and Range Experiment Station.]

Reviews the history of the shelterbelt plantings of the 1930's, and the appraisals of 1944 and 1954; assesses the performance of the principal species; and summarizes the necessary lines of research.

1594. NAPIER, C. L. **Shelter for horticultural crops in Hawkes Bay.** *N.Z. J. Agric.* 91 (3), 1955 (297–301, 303). 3 refs. A.P.B.

Species suitable to the district, with notes on their silvicultural characters, propagation, planting and tending.

268. Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.

See also Nos. 1299, 1711, 1719, 1722, 2333–4, 2340, 2346.

1595. **Forest grazing in Japan.** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/58, 1955. pp. 14.

Gives an account of : (1) the history of forest grazing and present range in Japan; (2) management of woodland pasture in Japan; (3) current researches on woodland pasture in Japan.

1596. WALTER, H., and VOLK, O. H. Grundlagen der Weidewirtschaft in Südwestafrika, und Bestimmungsschlüssel für die südwestafrikanischen Grasgattungen. **[Bases of pasture management in South-west Africa, with a generic key to its grasses.]** Eugen Ulmer, Stuttgart. 1954. pp. 281. [G.]

Describes the climate, soils, and natural pastures, methods for their improvement, food values of grasses and other fodders, and the poisonous plants. Includes a generic key to the grasses with 51 drawings of grasses and 41 of other plants with descriptive notes.

1597. MONROE, L. W., and PARKINSON, B. **White Cedar is poisonous to pigs.** *Queensland Agricultural Journal, Brisbane* 81 (2), 1955 (107–8). O.R.E.

The berries of *Melia dubia*, particularly when ripe, have caused mortality in pigs if consumed in some quantity, e.g. after a gale, or when penned pigs were let out on pasture containing White Cedar; 2 or 3 dozen berries are considered a dangerous dose for sucking pigs.

1598. CALLOW, L. L. **Sawfly poisoning of cattle.** *Queensland Agricultural Journal, Brisbane* 81 (3), 1955 (155–7). 1 ref. O.R.E.

The larvae of *Platypsectra* [*Pterygophorus*] *interrupta*, alive or decayed, which accumulate in great masses under their host trees—chiefly Silverleaf Ironbark [*Eucalyptus melanophloia*]—particularly in hot weather, are highly poisonous to cattle, which sometimes develop a perverse appetite for them. Providing pasture free of Ironbark (e.g. by band girdling the trees) is the only protection, as ordinary insecticides are not effective against the sawfly. Its main natural enemy is the oppossum. Description and life history are given.

1599. CAMPBELL, R. S., and CASSADY, J. T. **Forage weight inventories on Southern forest ranges.** *Occ. Pap. Sth. For. Exp. Sta.* No. 139, 1955. pp. 18. 9 refs.

Chiefly a description of field methods, with an appendix giving broad forest range types.

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

1600. KOMKRIS, T. **[The establishment of botanical gardens, arboreta and national parks in Thailand.]** *Vanasarn* 12 (4), 1954 (13–22). [Siam.e.]

An account of the work of the Forest Department since 1942 in establishing the Pu Kae botanical garden, the Heoy Koew arboretum and 3 national parks. Additions proposed under the 5-year Forestry Development Plan are listed; they include a botanical garden at Bangkhen, Bangkok, and 6 arboreta and 14 parks in many parts of the country.

1601. MORLING, R. J. *et al.* **Trees in towns.** Estates Gazette Ltd., London. 1954. pp. 79 + 14 photos. Price 7*s.* 6*d.*

Includes a selected list of recommended species for planting on different soils, sites etc., and chapters on trees and the law (*J. T. Plume*) and trees and highways (*D. V. Wells*).

28. Husbandry of Forest Products Other than Wood

See also section 892.

281. Christmas Trees

1602. FOX, H. W. **Trial of a proprietary plant food to improve color in Christmas trees.** *For. Note Ill. agric. Exp. Sta.* No. 56, 1955. pp. 3.

Tests of a commercial fertilizer to be applied as a foliage spray, showed no difference between treated and untreated chlorotic trees (Jack and Scots Pine) 3 months after application.

282. Bark Crops

See Nos. 1256, 1421, 1526, 1575, 2314.

1603. MARION, J. À propos du traitement des suberaies incendiées. [**The treatment of burnt Cork-Oak stands.**] *Rev. for. franç.* 7 (12), 1955 (855–67 + 8 photos.). 12 refs. [F.]

Gives the results of a study of the Zaïan-Zemmour Cork Oak stands in Morocco after disastrous fires in 1954, with special reference to the question of survival, recovery, and coppicing, as a result of which the following recommendations are made for the treatment of fire-damaged Cork-Oak stands. (1) It is necessary to fell, within 2 months of the fire, all trees that have been stripped in the preceding 3–6 years; all trees < 30–35 cm. d.b.h. and 2–4 m. high, which are likely to put out epicormic shoots and so become difficult to strip (these will all replace themselves by coppicing); and all trees that have been completely burnt (by proximity to heaps of tanbark etc.). (2) There is no need to fell young trees < 2–2·5 m. high, which will coppice without interference, while their burnt aerial parts will disappear naturally within a few months. (3) All other trees should be left standing for at least a year, to see if they will put out fresh leaves, which they will almost all do in the winter following the fire, contrary to hitherto received opinion.

283. Fruit and Seed Crops

See also Nos. 1582, 2328–32.

1604. SAMPAIO, J. SALAZAR. Para o estudo económico de castanheiro de fruto (Concelho de Armamar). [**An economic study of Chestnut-growing for fruit production (District of Armamar).**] *Estud. Inform. Serv. flor. aqüic, Portugal* No. 51–G3, 1955. pp. 39 + 4 tbls. + 5 gphs. [Port.f.] Limited distribution.

Presents estimates of costs of establishing, and revenue from, 6 different types of stand, 3 representing the schist zone and 3 the granite zone of the Armamar district.

1605. THIRAVAT, S. [**Tung oil tree (*Aleurites montana*).**] *Vanasarn* 11 (2), 1953 (27–34, 37). [Siam.e.]

In view of the economic importance of Tung and the general suitability of the wetter northern provinces of Thailand for its growth, the author urges the importance of undertaking plantations on a commercial scale. Trial plantings in N. Thailand, started in 1941, were interrupted by the war, but resumed up to 1951, by which time some 461 *rais* [1 *rai* = 0·40 acre] had been established. From 1956 it is planned to plant 600 *rais* p.a. Native seeds have been sent to the USA for analysis.

284. Crops Tapped for Exudations

See also Nos. 1212, 1946, 2314.

1606. **American resin tapping.** *For. Equipm. Note, FAO* No. *C.* 7.55, 1955. pp. 2.

A note on the use of spiral gutters, their installation and maintenance. [Cf. *For. Abstr.* 15 (No. 2539).]

1607. DEAVER, C. F., and HASKELL, H. S. **Pinyon resources. Distribution of Pinyon (*Pinus edulis*), yield and resin potentialities, Navajo-Hopi reservations, Arizona-Utah.** University of Arizona Press, Tucson. 1955. pp. 37. 25 refs. L.S.

A report on investigations sponsored by the Bureau of Indian Affairs in connexion with a development survey, with vegetation maps showing 3 *Juniperus osteosperma*/*Pinus edulis* types (with either the Pine or the Juniper dominant or both about evenly mixed), a grass and shrub type in the lower region, and *P. ponderosa* in the upper. Though the resin of *P. edulis* has some desirable qualities—yielding a rosin of greater water-resistance than ordinary rosin, and valuable volatile oils—the low output per tree and the general inaccessibility of stands of the required density (20–25 trees of d.b.h. > 6 in. per acre) make its collection doubtfully economic. Further research, e.g. on the use of acids in tapping and multiple utilization of the Pine, is recommended.

1608. OLOVENIKOV, JU. B. Vlijanie glubiny podnovki na smoloproduktivnostj sosny pri podsočke. [**Effect of freshening depth on the resin yield of tapped Pine.**] *Gidrol. lesohim. Prom.* 8 (5), 1955 (11–3). 2 refs. [Russ.] P.R.

Careful examination of felled trees showed that the considerable drop in resin yield observed in some trees is due to the drying out of the sapwood, caused by the injury done to the vessel system by a few deeper freshenings (e.g. penetrating to half the depth of the sapwood).

1609. LÁNYI, J. Gyantatermelésünk továbbfejlesztésének útja. [**The means of developing resin production [in Hungary].**] *Erdö* 3 (8), 1954 (296–8). [Hu.]

Tapping of conifers is generally harmless if continued for ⩾ 3–5 years before felling. Longer periods tend to cause substantial damage to stands and may affect timber quality, the tolerance of trees to this practice varying with environmental conditions. Improved techniques such as the Polish method, using narrow faces, raised average resin yield in Hungary from 1·29 to 1·48 kg. per tree (maxima up to 5·43 kg.) in 5 years without any lengthening of the period of tapping.

1610. LÁNYI, J. Gyantatermelési kísérletek. [**Resin-tapping experiments.**] *Erdész. Kutatás., Budapest* No. 3, 1954 (115–29 + smries. in suppl.). [Hu.e.g.russ.]

A report on continuing small-scale experiments (300 to 425 trees) with various types of face and freshening tool. Indications for Scots Pine are that, if properly controlled, multiple narrow ('Polish') faces—one on trees 20–30 cm. in d.b.h., 2 on 30–40 cm., 3 on higher diameters—give the optimum sustained yield compatible with timber production. For Austrian Pine, which has been shown by enumeration in 1952 to form as much as 20% of all

trees tapped in Hungary, new methods need working out in view of its different resin-duct pattern, based on, but improving on Austrian practice. A small preliminary experiment using the narrow Polish face and one Viennese to 3 Piesting plane streaks (freshenings), is described. The importance of temperature has been demonstrated in the greatly stimulated resin flow from streaks made in the morning during spring and autumn, and in the afternoon during summer, total yields rising by 10–25%.

1611. Nikolić, S. Pet godina smolarenja crnog bora u srezu Studeničkom. **[Five years of *Pinus nigra* tapping in the Studenica district. [Serbia].]** *Šumarstvo* 8 (7/8), 1955 (488–94). [Serb.]

The district supplies over 28% of Serbia's resin production. Roughly 100,000 faces were exploited every year during 1950–54 in the Raška area (Broenica and Trnava catchment) and ca. 50,000 in the Ušće area (Studenica catchment). The yield of resin per face in the former rose from 286 g. in 1950 to 733 g. in 1954, while in the latter the figures are 319 and 428 g. for 1951 and 1954, respectively. All other conditions being about equal, the difference is attributed to the difference in interest taken by the locally recruited labour. Tapping follows a modification of the German method. The face is 10 cm. wide, freshenings 0·7–1·0 cm. wide and 0·3–0·5 cm. deep. They are made every 4 days in the colder, and every 3 days in the warmer months. A feature of the method is the smoothness of the face, due to the shape of the tool, which assists healing. So far, tapping has not exceeded a height of 1·8 m., but since 1955 tools are available for tapping up to 3 m.

1612. Schopmeyer, C. S., and Larson, P. R. **Effects of diameter, crown ratio, and growth rate on gum yields of Slash and Longleaf Pine.** *J. For.* 53 (11), 1955 (822–6). 3 refs. [Southeastern Forest Experiment Station, Lake City, Fla.]

In a local study, using bark-chipped, acid-treated streaks, the regression equations for yield were: *Pinus elliottii*, $Y = -242{\cdot}7 + 28{\cdot}49\ D + 390{\cdot}6\ CR$ and $Y = -241{\cdot}3 + 28{\cdot}44\ D + 1094\ RW$; *Pinus palustris*, $Y = -223 + 25{\cdot}13\ D + 366{\cdot}7\ CR$ and $Y = 190{\cdot}1 + 26{\cdot}66\ D + 1163\ RW$, where Y = mean annual yield in barrels of 435 lb. per 10,000 faces; D = d.b.h. (ins); CR = crown length/total height of tree; and RW = mean ring width (in.) of the outermost inch. Using D alone gave higher significant correlations but, owing to the wide range with D of CR, which is strongly affected by stand density, such equations are unlikely to be of wide application. The introduction of RW did not increase precision, but may be useful in examining the effect of site. The silvicultural and economic implications of these facts are discussed. On sites poorer than average the present minimum diameter of 9 in. should be raised to at least 10 for a profitable tapping operation.

1613. Nilphanu, S. **[An experiment on increasing yield of turpentine from local Pine trees by acid treatment.]** *Vanasarn* 11 (4), 1953 (29–40). [Siam.e.]

Pines in Thailand have hitherto been tapped on the French (Hugues) system. The author, on the basis of his experience in the U.S.A., began experiments in 1950, using 3 new types of face plus stimulation with H_2SO_4, on *Pinus khasya* and *P. merkusii*, viz. (1) round disks of 2 in. diam. and $\frac{1}{8}$ in. deep beyond the cambium; (2) a slanting cut 6 in. long. 2 in. wide and $\frac{1}{2}$ in. deep, ca. 30° from the horizontal; (3) wide V-shaped cuts, each arm of the V extending to ca. $\frac{1}{3}$ of the tree's girth, ca. $\frac{1}{2}$ in. deep for *P. merkusii* and 1 in. for *P. khasya*. The various faces are illustrated. Results [number of trees, faces, and tapping seasons not stated] were as follows: All faces treated with 50–60% H_2SO_4 gave the best yields, roughly twice that of controls. Yields of *P. merkusii* were, *ceteris paribus*, roughly twice those of *P. khasya*; natural flow in the former lasted for 7–10 days after freshening, prolonged to 3 weeks with 50–60% acid. Corresponding figures for the latter were 2–3 and 5–7 days only. Trees of 5–5½ ft. girth gave the highest yield. The yield from any one tree differed at different heights up the bole.

1614. Nui, N. **[Tapping of Yarng oil.]** *Vanasarn* 11 (3), 1953 (36–42). [Siam.e.]

Describes the native method of tapping, which continues to be very wasteful (too many notches per tree and careless burning to stimulate the flow of oil) owing to disregard of the rules issued by the Ministry of Agriculture under the Forest Act of 1941. These require licensees (*a*) to tap no trees < 2 m. in girth at 1·50 m. from ground level, (*b*) to cut only 1 notch in trees of 200–250 cm. girth, 2 in trees of 250–300 cm. girth, and 5 in larger trees, (*c*) to restrict the size of the notch to 30 cm. width and 30 cm. depth. There is a general belief that notches give the highest yield when cut on the side of the bole where the largest branch is found. [Cf. *For. Abstr.* 17 (No. 2280).]

1615. That-Thiem-Romya, P. **[Dammar tapping from *Balanocarpus heimii*.]** *Vanasarn* 11 (1), 1953 (19–24). [Siam.e.]

A short account of the native method of tapping (by shallow hacks up the stem). Experiments in Pattani [southern Siam] on 80 trees in 1933 showed that the best yield and quality of dammar is obtained by collecting at about 3-monthly intervals. Malayan experience indicates that the best yield comes after a tree has been tapped for 12 months. Total production from the 3 southern provinces (Yala, Pattani and Narathivat) was 330,392, 288,489 and 319,177 kg. in 1949, 1950 and 1951 respectively.

1616. Phanpeng, C. **[Tapping of lac resin in Chiengmai.]** *Vanasarn* 11 (2), 1953 (61–9). [Siam.e.]

An illustrated account of the tapping of *Melanorrhoea usitata* in Thailand. Pre-war experiments in Chiengmai [N. Thailand] showed that tapping in the rains gives the highest yield, and in the transition period between the cold and hot seasons the lowest. A single notch on a medium-sized tree yields in a 7-day period an average of 120, 50 and 10 c.c. of lacquer in the rains, cold season and hot season respectively.

1617. Morrow, R. R. **Influence of tree crowns on Maple sap production.** *Bull. Cornell agric. Exp. Sta.* No. 916, 1955. pp. 30. 9 refs.

Sugar Maple trees and stands exhibit great variability in % sugar in the sap. In closed stands, the influence of crown on sugar % was found by measuring crown diameter. In open stands, both crown diameter and live-crown ratio were useful in measuring crown influence. The degree of openness of the stand exerts a positive influence on sugar % over and above the size of the crown itself. A study of 30 stands showed that syrup production per bucket is increased in proportion to increases in average crown diameter. Syrup production per acre is about the same, regardless of the size of crowns. Increased syrup production per bucket, however, results in considerable saving in costs. [Cf. *For. Abstr.* 16 (No. 1793).]

288. Crops Grown for Animal Products

See No. 2297.

289.4. Shade Trees for Crops

1618. **Coffee shade trees.** *For. News Latin Amer. FAO* Nos. 9–10, 1955 (1–2; 1–2). [E.]

Presents answers to a questionnaire on coffee shade trees from countries in South and Central America, the West Indies, Mexico, Tanganyika and the Cameroons.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. Work Science (Work Studies): General

1619. STEINLIN, H. Criteri e metodi consigliabili per il relievo dei tempi nella sperimentazione. **[Criteria and methods for the measurement of time in work studies.]** *Schweiz. Z. Forstw.* 106 (8), 1955 (460–72). [It.g.]

304. Hygiene. Safety. Accidents and their Prevention

See No. 1995.

305. Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)

See No. 1501.

307. Tools, Equipment, Machines and Working Animals: General

See also Nos. 1441, 1464–5, 1488–90, 1532, 1539, 1706–8, 1778.

1620. Informations sur le matériel. **[Notes on equipment.]** *Bois For. Trop.* No. 44, 1955 (76–81). [F.]

Illustrated notes on new equipment, including: the Attila brush-cutter (Éts. Creusy-Véron); Brushland Plow (designed by the U.S. Forest Service, and manufactured by The Rocket Implement Company, Los Angeles); Clico press for making earth pots (Clico Ltd., Sheffield); an electric forest crane and an electric logging arch (R. C. Letourneau, Longview, Texas); The Owen grab for handling pulpwood (Owen Bucket Co., Cleveland, Ohio); an Australian logging arch (L'Isles Forge & Engineering Co., Coff's Harbour, N.S.W.); the Méca winch (Éts. Méca, Belfort).

1621. **Equipment news.** *Unasylva* 9 (3), 1955 (138–40).

Describes, with photographs, the following: A swivel-frame which permits the front and rear halves of a lorry to rotate to either side independently, keeping all 4 wheels firmly on the ground; available for all makes of lorry (Truckstell Manufacturing Co., Cleveland, Ohio). Improved handhooks for handling pulpwood; the hook continues to bite as long as an upward pull is exerted, while double claws keep the bolt from turning (Forest Products Laboratory, Madison). The Drivall Post Driver, which drives a post directly into the ground without removing any earth; the driving tube rides over the post on the piston principle, enabling maximum power to be concentrated on the head of the post; it is hand operated by one or more men according to size of post (Drivall Ltd., Barnet, Herts.). The Sandvik Stump Vise No. 127, specially adapted for pulpwood saw blades, can be securely inserted in a stump or log, for filing in the woods without the use of screws or clamps (Sandvikens Jernverks Aktiebolag, Sandviken, Sweden).

31. Logging and Transport: General

See also Nos. 1693, 2315.

1622. LE RAY, J. Une exploitation forestière en Gold Coast: la Mim Timber Company. **[A forestry enterprise in the Gold Coast: the Mim Timber Company.]** *Bois For. Trop.* No. 44, 1955 (21–30). [F.e.span.]

The company works a 130,000-ha. concession, mainly for *Afrormosia elata, Entandrophragma cylindricum* and *E. utile*, to supply its mill at Mim (ca. 150 km. east of Kumasi). Methods of felling and transport, and the mill equipment and working are described.

1623. BALDWIN, H. I. **Finding the best use for each tree.** *J. For.* 53 (10), 1955 (714–6). 5 refs.

In New England, where the stands are commonly many-aged and may contain 40–50 species, integrated logging is advocated. A list of categories is given for the Fox State Forests itemizing these for logs (4), poles (2), posts (4), veneer and turning bolts, excelsior wood, powder wood, pulpwood, handle stock, cordwood (3), Christmas trees and greens, and tanbark.

32. Felling and Related Operations

See also No. 1899.

321. Marking

See Nos. 1640–1.

322. Felling Season. Preparatory Measures

See also No. 1674.

1624. DÉRFÖLDI, A. A fakitermelés ütemezése figyelemmel a fülledékeny anyagra. **[Planned felling with regard to timber decay.]** *Erdö* 3 (10), 1954 (346–9). [Hu.]

To save deterioration of felled timber of susceptible species such as Beech, Hornbeam, Maple and Birch, the author recommends that felling in Hungary should not begin before November and that all extraction should finish by the end of February.

1625. TUOVINEN, A. Tutkimuksia kemiallisesta kuorinnasta. **[Investigations into chemical barking.]** *Pap. ja Puu* 37 (12), 1955 (575–97). 1 ref. [Fi.e.] P.R.

In experiments in 1954–55 some 3000 trees of Spruce, Pine and Birch were treated each year with 40% Na arsenite solution, in 1954 in June [J.] July [Jy.54] and August [A.] and in 1955 in July only [Jy.55]. A draw-knife and a girdler were used, the poison being applied with a brush. Data of time and costs for a 3-man team are given. The girdler proved best for Spruce and the draw-knife for Pine and Birch. Labour costs increased steeply with decreasing stem size; small stems are better treated by one man for both girdling and application of the poison.

Barking experiments in autumn 1954 showed a saving in time of ca. 20% for treated Spruce and Pine, but less good results for small Pine. Treatment in August was too late for autumn barking. Low temperatures, preventing autumn barking, affected the treated more than the untreated trees. Autumn barking of Birch was not satisfactory. Time saved in storage-site barking of treated or untreated Spruce in May 1955 varied with the worker. In barking at the storage site the bark of A. Pine logs was looser than that of J. and Jy. 54, primarily because of differences in drying. In barking at the storage site 57% of J. Birch, 80% of Jy. 54 and 7% of A. could be barked without a spud. The small top logs were difficult to bark. Barking experiments in June 1955 showed that A. Pines produced 32% of logs difficult to bark, mainly those of small diameter, and Jy. 54 Pines 54%. Barking in the forest gave better results than barking at the storage site. The time saved in barking treated Birch in the forest was 37% for J., and 26% for Jy. 54. After mechanical barking in a pocket drum for 25 min. in May 1955, 80% of Jy. 54 Birch logs were cleanly barked. Comparative figures are given for logging costs (chemical treatment, felling, barking, haulage) of treated Birch, unbarked or barked in the forest, and of ordinary Birch pulpwood, strip-barked or partially barked in the forest. In winter 1955 drum-barking at the mill of treated, unbarked Spruce pulpwood took 3 hours against 8 hours for untreated. In June 1955, barking time of unbarked, untreated Spruce floated in bundles was nearly 5 hours. Blue-stain was frequent in conifers, especially those treated in June and July, and a brown stain in Birch. Spruce developed tannic-acid damage while standing. Insects were found in the wood of 27% of Pines treated in June, 2% of those treated in July and none of those treated in August. Similar damage on a smaller scale was found in Spruce. Treated Pines were lighter in weight by May 1955 than untreated. Treated logs of Spruce and Pine, especially small Pine logs, became more waterlogged during floating than untreated ones; but only one treated Spruce log sank. The waterlogging is attributed primarily to the absence of resin in treated logs. [Results are given in graphs and tables with English legends.] *From author's summary.*

323. Felling and Subsequent Primary Conversion

See Nos. 1633–9, 1642.

33. Degree of Utilization and Waste. Clearing the Felling Site. Harvesting of Small Wood

See also Nos. 1420, 1464, 2085–6, 2241.

1626. TRUE, R. P., JUDY, T. M., and ROSS, E. **The intake of solutions by freshly cut Oak stumps.** *Phytopathology* 45 (8), 1955 (466).

Abstract of a paper presented to the 1954–55 annual meeting of the Potomac Division, American Phytopathological Society. A study of the intake of water, water-soluble dye and water-soluble poison from stump-top reservoirs placed on Red Oaks cut in summer: absorption of water, dye and poison in litres/diam.-inch was respectively about 1·0, 0·5 (azosulphamide) and 0·1 (saturated $CuSO_4$). Coppice sprouts and root grafts greatly increased and prolonged absorption. In the latter case both dye and Cu were transferred to crowns of trees organically united.

1627. VLASEV, V. Počistvane na sečištata v čistite i smesenite smărčovi nasaždenija na UOGS 'G. St. Avramov' črez izgarjane na otpadăcite v kupčini. **[Clearing of felling sites in pure and mixed Spruce stands in the G. St. Avramov experimental forest by piling and burning slash.]** *Nauč. Trud. lesoteh. Inst., Sofia* 3, 1954 (127–58). 26 refs. [Bulg.russ.]

The felling sites investigated were: (*a*) 90-year-old *Pinus sylvestris*, site class (s.c.) I–II, with 1780 cu.m. (= 80·8 tons)/ha. of green slash; (*b*) 90-year Spruce, s.c. I, with 2120 cu.m. (= 90·8 tons)/ha. of green slash, and (*c*) 120-year Silver Fir, s.c. II–III, with 2980 cu.m. (= 131 tons)/ha. of green slash. The slash covered 35% of the felling area. Natural regeneration and its development on slash-burnt sites, particularly on those shaded by adjacent trees, was much better than elsewhere. It is advisable to turn the soil on slash-burnt sites in order to check the development of *Funaria hygrometrica*, which is prejudicial to tree regeneration. Soil on slash-burnt sites has less porosity, higher moisture content at 5–10 and 25–30 cm. depth, and greater numbers of micro-organisms.

1628. HOOKER, L. W. **Logging small hardwoods.** *For. Prod. J.* 5 (5), 1955 (312–6).

The aim of the study was to develop economic methods of harvesting thinnings in young-growth hardwood stands in the Lake States. Cost-increasing factors of small size of timber and small

scale of fellings were dealt with by a new technique in hardwood silviculture. Removing the thinnings in narrow strips resulted in a significant reduction of logging costs. *From author's summary.*

34. Storage in the Forest and at Log Dumps

1629. ŠIPEROVIČ, V. JA. O hranenii lesomaterialov v lesah Severa. **[Storage of timber in the forests of the North [of Russia in Europe].]** *Lesn. Prom.* 14 (6), 1954 (15–6). [Russ.] L.S.

Tabulates the final dates for storing unbarked timber in (1) depots of river-floated timber, and (2) intermediate land transport depots, for different periods of felling and for 3 different regions of the Karelo-Finnish SSR.

1630. LEH, A. M. Racionaljnaja planirovka prirečnogo nižnego sklada. **[Rational planning of a river-bank log depot.]** *Lesn. Prom.* 14 (3), 1954 (10–2). [Russ.] L.S.

Illustrated description of a depot on the Kerzhenets river, which is divided into 3 sections: (1) where work is done from the beginning to the end of loose-floating operations; it is equipped with an unloading and cross-cutting deck and one unit of a longitudinal conveyor; (2) for storing the timber between periods of floating; equipped with 2 such decks and 2 units of the conveyor; (3) for winter bundling of timber, with an unloading and cross-cutting deck and another 2 conveyor units. The merits of this lay-out are discussed.

1631. BREDELEV, N. V. Organizacija raboty na nižnih skladah pri vyvozke drevesiny v hlystah k splavu. **[Organization of work in log depots passing tree-length logs to water.]** *Lesn. Prom.* 14 (3), 1954 (4–9). [Russ.] L.S.

The Northern Branch of the Soviet Central Research Institute of Mechanization of Forest Industry has worked out 4 typical lay-outs: (1) log dump with a tractor ice-road adjacent to a river allowing a short period of loose floating; (2) as (1) but with a lorry road; (3) as (2), but adjacent to a river allowing a long period of loose floating and rafting; and (4) as (3), but with a narrow-gauge railway. The organization of work in each is discussed.

1632. MIRONOV, T. P. Sortirovka lesa na nižnem sklade pri pomošči reversivnyh vagonetok. **[Sorting in timber depots by means of a shuttle service of [cable-drawn] rail trolleys.]** *Lesn. Prom.* 14 (3), 1954 (12–3). [Russ.] L.S.

Where sorted timber can be stacked on one side only of the log-sorting elevator, e.g. in timber-floating depots, it is advantageous to substitute shuttled railway trolleys for the log-sorting elevator. Parallel to the railway line and on the other side of the cross-cutting sites another set of rails is laid, on which trolleys (2 for each cross-cutting site) can run to and fro on a winch-powered endless cable running between the rails. The driver moves the trolleys in one or other direction through a pedal-operated clamp that grips the appropriate section of the cable.

35. Performance Measurements for Determining Piece Rates in Felling and Related Operations

See also No. 1420.

1633. GIORDANO, G. Observations sur les temps de travail dans l'exploitation des taillis de châtaignier. **[Time studies on the exploitation of Chestnut coppice.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/16-D*, 1955. pp. 5. [F.] Limited distribution.

Studies were made on exploitation of Chestnut coppice in Italy for the production of (*a*) telephone poles, (*b*) agricultural assortments (stakes, fence posts etc.), (*c*) mixed assortments including firewood.

1634. HILSCHER, A. Die Österreichische Normalleistungstafel. **[Austrian standard tables for piece rates [in logging].]** *Mitt. forstl. VersAnst., Mariabrunn* No. 50, 1954. pp. 104. [G.]

The tables are based on earlier ones for Styria, which had been accepted for tariff negotiations by both sides of the industry, and are approved by the Österreichische Forstverein. Standard times per (round) cu.m. are given for the clear felling of Spruce under optimum conditions with % additions for other coniferous species and for difficulties, e.g. slope of site, branchiness or resinousness of timber, or weather, all based on the mean mid-diameter of the timber being extracted. The reason for this choice, and other theoretical considerations, as well as the underlying statistical analysis and experiments are discussed. [Cf. *For. Abstr.* 16 (No. 520).]

36. Tools, Machines and Equipment for Felling and Related Operations

See also Nos. 1420, 1468, 1621, 1655–6, 2009.

1635. SALMINEN, J. Pienpuiden kuorinta Kuori-Peto kuorimakoneella. **[Barking small wood with the Kuori-Peto barker.]** *Pap. ja Puu* 37 (10), 1955 (484–9). [Fi.e.] P.R.

Describes [with illustrations] the machine, which is intended for wood at least 1 m. long, diam. 5–11 cm. Barking is done by 4 detachable blades mounted in centrifugally loaded blade-holders on 4 rotating rings. Loose bark is removed from the machines by a centrifugal blower. Feeding is by feed- and guide-rolls at speeds of 14–31 m./min. In experiments, a crew of 3 barked green, unfrozen, 2-m. softwood logs, average diam. 8 cm. at a rate of 5 unbarked stacked cu.m. per working-site hour, i.e. a feed speed of 25·5 m./min. Frozen or seasoned timber could have been barked more quickly. Fuel consumption was 0·88 litre petrol (or, using an electrically driven motor, 1·6 KWH) per stacked cu.m. of unbarked timber. Bark spots were present in 11·1% of the barked timber, the remainder being completely free of bark. The loss of wood was 3·6% solid or 28·4% stacked measure, but in other experiments loss rose to 8·2% solid measure. Total barking cost was 267 marks per unbarked stacked cu.m. Costs for hand barking are 2–3 times greater. Costs can be further reduced by improving lay-out of the storage site and organization. *From author's summary.*

1636. MURRAY, A. **The Astrom barker.** *Timber of Canada* 16 (2), 1955 (17–20, 30).

Covers details of operation, maintenance and output over 3 seasons.

1637. PLATZER, H. B., and SACKEL, W. Über den DSD-Zahn und seine Leistung. [**The DSD saw tooth and its performance.**] *Forst- u. Holzw.* 9 (21), 1954 (443–5). 7 refs. [G.g.]

Gives specifications and maintenance instructions for handsaws with two forms of lancet-shaped teeth designed by *X. Hengst* (having wide square gullets below the level of the triangular cutting teeth). Tests showed that in cutting Spruce of 30-cm. diam., their performance was superior to saws fitted with triangular teeth according to *DIN* 6492, though inferior to raker-tooth saws. The better performance of the latter is, however, offset by difficult maintenance and the need for greater physical effort.

1638. REHSCHUH, D. Einmann-Motorsägen im Laubholz. [**One-man power saws in hardwood forests.**] *Forst- u. Holzw.* 9 (21), 1954 (441–2). 3 refs. [G.]

A paper read at the Geffa conference in Hann. Münden in 1954, giving performance data for work with 1- and 2-man power saws in stands with mean stem volumes from 0·05 to 2 cu.m., the 1-man saw being better for nearly all jobs. It proved particularly useful in the logging of windthrows, because of the small working space required.

1639. CHARDIN, A. Les scies à chaîne pour sciage en long. [**Chain saws for rip-sawing.**] *Bois For. Trop.* No. 44, 1955 (37–42). [F.]

Describes the method of rip-sawing with a portable chain-saw as practised in the U.S.A. on logs too large to be transported easily, and discusses the possibility of adapting the process for tropical conditions.

1640. JARVIS, J. M. **Rubber-base paint for tree marking.** *For. Chron.* 31 (3), 1955 (273–4).

Experiments have shown the efficacy of rubber-base paint for tree marking. Its advantages over lead-base paint are the use of water as a solvent, the smaller quantities needed, and lower cost. The only apparent disadvantages are quick drying, so that the paint gun must be cleaned soon after use, and the fact that the paint will freeze in winter.

1641. GEFFERT. Reisshaken-Verbesserung. [**An improved timber scribe.**] *Forst- u. Holzw.* 9 (22), 1954 (465–6). [G.]

Describes and illustrates a heart-shaped cutter, for clamping either to an ordinary handle or to a long stick (for branchy boles), which is said not to slip in use.

1642. GLÄSER, H. Die Bündelung von Schichtholz. [**The bundling of cordwood.**] *Holz-Zbl.* 81 (149), 1955 (1779–80). 2 refs. [G.]

Describes, with illustrations, (*a*) a circular hinged frame in two parts, for making round bundles of 1 or 2 cu.m. stacked measure fastened with steel bands; (*b*) (as round bundles are wasteful of loading space) a U-shaped iron frame for holding 1 cu.m. stacked measure, and (*c*) (as the frame is non-expendable and means return freights) a system of nearly cubic, cross-stacked piles secured with 2 steel bands at right angles. The logs at top and bottom lie in different directions, so that each steel tape slips *between* the logs on one side, and thus cannot slip off. When the logs shrink in drying the tapes can be tightened.

37. Transport

See also No. 1899.

372/377. Land Transport

See also Nos. 1620–2, 2244.

1643. STEINLIN, H. Gelöste und ungelöste Probleme beim Holzrücken and Holztransport. [**Solved and unsolved problems in the extraction and transport of timber.**] *Schweiz. Z. Forstw.* 106 (2/3), 1955 (122–40). 37 refs. [G.f.]

Summarizes developments in Switzerland in the last 15 years, (1) in areas where road transport is feasible, (2) in areas where cableways are necessary.

1644. SUNDBERG, U. Studier i skogbrukets transporter. Del. I. Allmänna betraktelser. Del. II. Transporternas samordning. [**Studies in forest transport. I. General considerations. II. The co-ordination of transport.**] *Svenska SkogsvFören. Tidskr.* 50 (4), 1952 (343–57); 51 (1), 1953 (15–72). 8 refs. [Sw.] (*Meddelanden från Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning* (*S.D.A.*) No. 48.)

Part I deals mainly with the distinction between different types of cost, especially between direct and indirect (roads etc., and storage installations) costs. Part II deals mainly with (1) the calculation of the distance at which a secondary form of transport (e.g. a change from tractor to lorry) becomes economic; (2) the co-ordination of primary and secondary transport so that the total direct and indirect costs are kept as low as possible and (3) the determination of the type of road giving the lowest total cost of transport. Formulae, using terms defined in an appendix, are given for calculating the various costs involved in these 3 processes, with examples of their use. Other appendices contain figures for costs of horse transport in N. Sweden in 1947 and of lorry transport in 1953, and terms used by the S.D.A. for studies of transport of timber by horses.

1645. KERESZTES, G. Bakonyi közelítési problémák. [**Problems of timber transport in the Bakony.**] *Erdö* 3 (10), 1954 (362–5). [Hu.]

Stresses the various objections to mechanical transport in areas of rugged topography—the expense of building cableways and chutes, the erosion hazard of tractor operation etc.—and urges the continuance of horse transport for distances up to 4–5 km. but with improved vehicles and tackle (illustrated) and a network of permanent roads reasonably accessible from the felling areas.

1646. BOLDT, C. E., and NEWPORT, C. A. **Logging time and cost as affected by width of cutting strip and slope.** *Res. Note Colo. Sch. For. Range Mgmt.* No. 1, 1955. pp. 2.

A study of the harvesting of Lodgepole Pine was made at Fraser Experimental Forest, Colo. Skidding was downhill on alternate clear-cut strips 1, 2, 3, or 6 chains wide. Width of strip had no observable effect on time of hooking, unhooking, delay, or travel for the single horse used, but affected costs through its influence on deck construction. Separate decks were needed for sawlogs, short poles and long poles, and construction costs/acre on 1-chain strips were twice those on 2-chain and 5 times those on 6-chain strips. Empty or travel time was significantly increased by increasing steepness of slope.

1647. KAUFMANN, G. VON. Das Treiben (Reisten) von Holz. **[The transport of timber by chutes.]** *Schweiz. Z. Forstw.* 106 (2/3), 1955 (140–6). [G.]

A short, general account.

1648. NEVSKIĬ, E. G. Samospuski na zimnih splotočnyh rabotah. **[Chutes in winter rafting operations.]** *Lesn. Prom.* 14 (9), 1954 (22–3). [Russ.] L.S.

Describes several chutes used for conveying short (2-m.) firewood logs, sleepers, or other logs from the unloading site on the high bank (4–5 m. height) to the bundling depot at river level.

1649. ANDREĬČUK, I. JA. Koefficient trenija brevna po mokromu lotku. **[Coefficient of friction of the log against a wet flume.]** *Lesn. Prom.* 14 (3), 1954 (28). [Russ.] L.S.

Results of kinematic tests conducted on a straight 90-m. flume of constant slope (ca. 1/5) yielded the following empirical formulae for the coefficient of friction: (1) $f = 0{\cdot}187–0{\cdot}0065\ v$, for barked and unbarked Beech logs and a flume of unplaned Fir boards, and (2) $f = 0{\cdot}20–0{\cdot}008\ v$, for barked Fir logs and a flume of unplaned Fir or planed Beech boards; also for barked or unbarked Beech logs and a flume of planed Beech boards. These formulae, where v is the velocity of the log, are applicable for velocities between 2 and 20 m./sec., with an accuracy of $\pm\ 0{\cdot}02$.

1650. **Timber extraction in Nyasaland by Wyssen Skyline crane.** *Nyasld. Fmr. For.* 1 (3), 1953 (14–9). 1 ref.

Details of topography (Mlanje and Zomba Mts.), species transported, former extraction of pitsawn balks by headload, and the recent installation of sawmills and cableways. [Cf. *For. Abstr.* 14 (p. 4).]

1651. NARUSE, Y., and OKAWARA, S. **[Tension of skyline cables measured by the vibration method.]** *Misc. Inform. Tokyo Univ. For.* No. 10, 1955 (49–53). [Jap.]

In a series of calculations, confirms the experimental results of Kato and Maruyama. [Cf. *For. Abstr.* 15 (No. 3648).]

1652. **Two types of equipment for loggers.** *For. Equipm. Note, FAO* No. *C.* 8.55, 1955. pp. 2.

Describes two loading devices; (1) lift tongs for Allis Chalmers HD-15b, and (2) the Terra Logger, both designed to pick up and lift logs in the forest or the timber yard.

1653. LE RAY, J. Deux exemples de matériels nouveaux d'exploitation forestière réalisés en Côte d'Ivoire. **[Two examples of new logging equipment in use on the Ivory Coast.]** *Bois For. Trop.* No. 43, 1955 (15–19). [F.]

Describes, with photographs, the use of (1) easily built shear legs for loading trucks, and (2) a truck fitted with crane and winch.

1654. BALOVNEV, P. F. Pogruzočnyĭ kran na traktore KT-12. **[Loading crane on the KT-12 tractor.]** *Lesn. Prom.* 14 (3), 1954 (18–20). [Russ.] L.S.

Illustrated description of the crane, which includes the following equipment: additional winch (identical with the tractor winch); steel boom; 5 three-ton pulleys; and 60 m. of 15–17·5-mm. cable. The mean performance (over a period of 1 year) is 98·8 cu.m. per machine/shift.

1655. AMALICKIĬ, V. M. K daljneĭšemu progressu lesozagotoviteljnoĭ tehniki. **[Further progress in logging techniques.]** *Lesn. Prom.* 14 (8), 1954 (7–12). [Russ.] L.S.

Brief technical descriptions and illustrations of the following devices scheduled for mass production in 1954 or 1955; (*a*) the one-man, petrol-driven saw 'Družba'; (*b*) the RES-1 trimming saw; (*c*) electric appliance for sharpening and jointing CNIIMÈ UZS-5 circular saw blades; (*d*) the DT-54 skidding tractor; (*e*) the L-19 skidding winch; (*f*) the LS-20 self-propelled winch; (*g*) ZIS-151, MAZ-200 and MAZ-501 lorries; (*h*) CNIIMÈ-2-PR-1OH and 1-AP-5, trailers, and AOS-6 sledges; (*i*) the DOS-1 barker for pulpwood and mining props; (*j*) the TOS-1 sectional conveyor; (*k*) the D-1-12-GD gas producer, and various apparatus for the chemical processing of wood.

1656. LAĬKO, M. V., and IPPOLITOV, K. A. Agregatnaja lesozagotoviteljnaja mašina na baze avtomobilja ZIS-151. **[Compound logging machine mounted on the ZIS-151 lorry.]** *Lesn. Prom.* 14 (6), 1954 (9–14). [Russ.] L.S.

Illustrated description of a compound logging machine designed and built in 1953–54. It is mounted on a ZIS-151 lorry and includes the following accessories: (1) a two-axle, 10-ton semi-trailer of CNIIMÈ design; (2) the KT-12 tractor skidding-winch with a cable-layer (behind the lorry chassis); (3) an electric generator ČS-7, 12 KW; (4) a loading drum, for loading the lorry with tree-length logs (also behind the cabin); (5) a special power take-off; (6) chain transmissions between the power take-off, winch and cable-layer; (7) texrope[-type?] transmission between power take-off and generator; (8) metal stanchions (on the lorry and semi-trailer frames); (9) two guide pulleys for skidding on the front stanchions of the lorry, and loading pulleys on the others; (10) a 125-m. skidding cable of 12 mm. diam.; (12) a CNIIMÈ-K5 electric saw with a 180-m. lead; and (13) auxiliary pulleys for use on the felling site. The machine has been designed for logging, skidding, loading and transporting tree-length logs to forest depots. In 1954, during the first trials, a team of 4 men working with the prototype of this machine succeeded in logging and transporting

up to 18 cu.m. of timber for 15 km. in 8 hours, equivalent to 4·5 cu.m./8 hours/man. It is hoped to increase this figure to 7–8 cu.m. Since the electric generator makes night work possible, it is believed that the output per 24 hours will rise to 30–35 cu.m. The use of this machine entails the building of 2–3 times as many temporary lorry roads as would be required without it. The merits of the new technique are discussed.

1657. UPTON, R. W. **Mechanical hauling field meeting. Featuring: the Mark IV Bonnard logger.** *Pulp Paper Mag. Can.* 56 (12), 1955 (208 . . . 214)

Includes an account of the experimental development of this logger, now going into production, and said to move 70–80 cords/hour 1000 ft. from stump to intermediate landing over the various ground encountered.

1658. Bättre släpfordon till hjultraktorn. **[Better trailers for wheel tractors.]** *Skogen* 42 (22), 1955 (402–3). [Sw.]

Twenty-one trailers (either with wheels or runners) were submitted for test, by a number of Swedish firms. Nine of the prize-winning models in 3 quality classes, are briefly described.

1659. MILLER, M. S. Vyvozka lesa v hlystah po avto-snežnoĭ doroge. **[Transport of tree-length logs on snow roads.]** *Lesn. Prom.* 14 (12), 1954 (4–5). [Russ.] L.S.

Illustrated description of a simple device preventing the swaying and wobbling of sledges at speeds exceeding 15–20 km./hour. It consists of a flange welded to the runners, which cuts into the snow and thus stabilizes the motion of the sledge.

1660. MILLER, J. W., JR., and POST, D. M. **Tandem-wheeled logging sulky for Southern Pine region.** *Res. Rep. Fla. Sch. For.* No. 2, 1953. pp. 6.

Gives specification, scale plans, photographs, materials, and costs of a 4-wheeled sulky constructed of readily available materials, such as old lorry tyres, track rollers, and piping.

1661. DAVIDSON, D. L. **Report on semi-trailer haul—4 ft. bundled wood.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1509 (*B*-8-*e*), 1955. pp. 2.

Gives general notes on the operation and the specification, cost, and application of the King model L.5 semi-trailer. Suitable slings are illustrated and production (seasonal and daily) details included.

1662. SÖDERLUND, J. A., and FRIEBERG, B. Hjultraktorn i transportarbete: en teoretisk utredning. **[Wheel tractors for transport: a theoretical analysis.]** *Svenska SkogsvFören. Tidskr.* 52 (4), 1954 (331–79). [Sw.]

Discusses technical, static and dynamic factors that may affect the tractor's equilibrium, causing rearing or skidding, and gives numerous formulae for calculating safety limits.

1663. HUNT, B. H. **Snowmobile-tractor (Bombardier J 5).** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1508 (*B*-8-*e*), 1955. pp. 3.

Specification, performance characteristics and comments on its use for snow 'beating'.

1664. PERFILOV, M. A. Modernizacija trelevočnogo traktora KT-12. **[Modernization of the KT-12 skidding tractor.]** *Lesn. Prom.* 14 (8), 1954 (12–4). [Russ.] L.S.

Describes the changes introduced in the KT-12 tractor: e.g. types of bearings, lubricant, details of the Cardan shaft and of winch drum. The tractor is powered by the new Ural ZIS-352T gas-producer.

1665. AĬZENBERG, A. I. Novoe trosovoe oborudovanie dlja trelevočnyh traktorov. **[New type of cable equipment for skidding tractors.]** *Lesn. Prom.* 14 (1), 1954 (11–3). [Russ.] L.S.

Describes the new equipment used with success on two tractor models in many logging undertakings in the Urals. The S-80 is now furnished with two haul-in cables (19·5-mm. diam., 12–15 m. long), three sets of chokers, and two main-haul cables (19 mm.-diam., 1 m. long). The KT-12 has two haul-in cables (15·5-mm. diam., 40–50 m. long), three sets of chokers, and one main-haul cable 5–10 m. long.

1666. PODVJAZKIN, K. A., SMIRNOV, M. P., and GRAČEV, V. A. Mehanizacija puteukladočnyh rabot. **[Mechanization of rail-laying.]** *Lesn. Prom.* 14 (5), 1954 (4–7). [Russ.] L.S.

Describes the performance of the KT-12 tractor [cf. *For. Abstr.* 16 (No. 1840)]. Illustrates and describes the special PPR-2 rail-laying train, comprising a self-propelling electric generator, flats for track components and a crane for the laying and taking up of narrow-gauge rails.

378. Water Transport

See also Nos. 1629–31, 1648.

1667. HAFNER, F. Zur Geschichte des Wassertransports von Holz, besonders in Österreich und Deutschland, von den Anfängen bis zur Jetztzeit. **[The history of water transport of timber, particularly in Austria and Germany, from early times to the present.]** *Zbl. ges. Forstw.* 74 (1), 1955 (27–47). 79 refs. [G.]

Describes many old booms and weirs, e.g. a boom near Hördten, Baden, whose stone pillars bear a series of dates going as far back as A.D. 971. River driving and rafting, originally the chief means of transport for timber in the Alps, have almost disappeared, driving in particular being considered harmful to timber quality and responsible for bad cutting practices. Although 1300 km. of waterway were stated to exist in Austria in 1936, hardly any are used to-day. Rafting on the Danube declined from e.g. 1653 rafts in 1858 to 159 in 1950. The picture for Germany is similar.

1668. MÜLLER, K. Flottledsrensningens inverkan på fisket. **[The effect on fish of cleaning floating channels.]** *Årsb. svenska Flottledsförb.* No. 28, 1954 (5195–205). [Sw.]

Discusses the effect of various measures (e.g. tractor cleaning, the use of explosives, and channel improvements) on fish populations and their food. [Cf. *For. Abstr.* 17 (No. 494).]

1669. RENAUD, H. **Report on the Longlac interseason wood landing.** *Pulp Paper Mag. Can.* 56 (11), 1955 (147 . . . 154). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1513 (*B*10).)

Describes in detail the lay-out, construction and operation of a landing in shallow waterway water (limits 1–3 ft. at shore and 8 ft. at a distance of 350 ft. from shore). Log bundles are laid parallel with the shore, proceeding outwards in 3 rows, the centre providing a matted roadway down which trucks back for unloading by dragline. Advantages (e.g. in extending the trucking season) and costs are indicated.

1670. JAKOVLEV, G. D. Splav lesa v pučkah voljniceĭ. **[Loose floating of timber bundles.]** *Lesn. Prom.* 14 (3), 1954 (20–4). [Russ.] L.S.

Describes the bundling methods adopted in two river-bank timber depots (on a Sukhona river tributary), the launching of bundles, their floating, and the work done at the floating-and-rafting depot. The merits of this kind of floating are discussed, and efficiency figures tabulated.

1671. VOLODENKOV, F. I. Lebedka VL-3 na koševnom ozernom splave. **[The VL-3 winch for towing bag booms on lakes.]** *Lesn. Prom.* 14 (7), 1954 (25–7). [Russ.] L.S.

Illustrated description of the VL-3, comprising an amphibious tractor built on the lines of the KT-12 tractor, with a 5-ton, 3-drum winch. The ZIS-5 engine, of 73 h.p., gives a land speed of 2·5–15 km. (forward), 3·5 km. (reverse) and a water speed of 7·5 km./hour. The VL-3 is 8 × 3·1 × 3·16 m., weighs 10·6 tons and has a draught of 1·25 m. It can negotiate gradients up to 35–40°, and low banks (> 4 m. high) up to 60–70°. It gave an excellent performance in towing bag booms on small and medium lakes.

1672. LJVOV, I. P. Volnoustoĭčivyĭ pučkovyĭ plot 'CNII lesosplava-3'. **[The 'CNII lesosplava-3' multiple-bundle raft, resistant to waves.]** *Lesn. Prom.* 14 (5), 1954 (24–7). [Russ.] L.S.

Illustrated description of a raft developed by the Central Research Institute for Timber Floating, for towing on lakes and water reservoirs at wind forces of 5–6 and wave forces [*sic*] of 4–5. The primary bundles have a cross-section/axis ratio of 1·75 and a draught of 2·2 m. They are built up into sections 3–4 bundles wide and 8–15 bundles long, with a stiffener of single logs round each section and transversely between the rows, the logs being linked together by chains or other devices. Flanking each section are two rows of bundles rigidly connected to each other, while at the head and tail of each section are bundles at least 6·5 m. long, rigidly interconnected by beams and bindings. All other bundles have no cable connections with the raft as a whole; the raft is formed from sections that are joined together at internal corners and at 2–3 places between the corners. The prototype raft had the following dimensions: length 337 m., maximum width 18·5 m., minimum draught 1·7 m., number of sections 8, and total timber volume 5007 cu.m. Tests conducted on lakes Ladoga and Onega showed its complete suitability for the rough conditions specified. [Cf. *For. Abstr.* 14 (No. 2327).]

1673. ARO, P., and TURJA, M. Uittohäviöön vaikuttavat tekijät: kirjallisuustutkimus. **[Factors influencing loss during floating: a study of the literature.]** *Commun. Inst. for. Fenn.* 42 (8), 1955. pp. 92. 75 refs. [Fi.e.]

A review of literature (almost entirely Scandinavian) under the heads: influence of wood and its properties, time and method of felling, barking and storing, water and air temperature, length of floating time and season, quality of waterway and strength of current, qualitative floating loss, and measures for reducing floating loss. There is a 6-page English summary.

1674. TUOVINEN, A. Talvella niputettujen mänty paperipuiden uittohukasta. **[Floating loss of Pine pulpwood bundled on ice.]** *Metsät. Aikak.* 1955 (11), (370 . . . 378). [Fi.e.]

In an investigation in Central Finland, pulpwood bolts 3 to 4 m. long, that had been felled in 1953 or in 1954 and stored in different ways, were bundled on lake ice in March 1955. The bundles were launched in early May and undone during floating towards the end of June or in mid-August. Bad weather in late summer and autumn 1954 and in April 1955 must be considered in assessing the results. Loss in pulpwood felled in autumn 1953 (over 5000 bolts), and well stored in crosswise stacks on the shore, was 0·7% for bundles opened in June and 1·2% for those opened in August. Corresponding figures for wood felled at the same time but not stacked until July 1954 were 9·6 and 23·1%; percentage of losses by volume and by number were very similar, much of the loss being in large diameter classes. Loss of bolts carelessly stacked on shore and especially on the ice was greater than that of well stacked bolts in bundles opened in June. Loss from pulpwood felled in July–Aug. 1954 and stacked in the forest was almost the same as that of wood felled in 1953 and stacked on the shore in July 1954. Loss of pulpwood prepared in autumn 1954 was heavy. Floating loss of summer-felled pulpwood was heavy in the large-dimension classes and of autumn-felled wood in the small-dimension classes. A clear inverse relationship existed between floating losses and heartwood % in pulpwood felled in summer or autumn 1954. Graphs and tables have English legends.

1675. **[Sorting floated timber.]** *Årsb. svenska Flottledsförb.* No. 28, 1954 (5211–51). [Sw.]

Includes papers by H. Bucht, I. Eidem, V. Sundberg, B. Matérn, and A. Lignell, with discussion. Covers type and design of installation, crews, methods and the effect of different factors on speed and accuracy of work.

1676. KOZANOV, D. I. Novyĭ barabannyĭ uskoritelj dlja sortirovki lesa. **[A new propelling drum for the sorting of floated logs.]** *Lesn. Prom.* 14 (5), 1954 (27–8). [Russ.] L.S.

Illustrated description of a drum 302·5 cm. long, 30 cm. diam., weight 120 kg., running at 80 rev./min.

on 2·8 KW. It is set on springs and driven through a Cardan shaft.

1677. KUZNECOV, D. V. Vnedrenie novyh uskoriteleĭ na formirovočnyh reĭdah. **[New ways of moving log bundles at raft-making depots.]** *Lesn. Prom.* 14 (11), 1954 (27–9). [Russ.] L.S.

Illustrated description of new types of accelerators used in rafting depots on large reservoirs (artificial lakes) in the absence of water current: (1) a twin-cable accelerator, maximum length 600 m., which moves bundles direct from the bundling machine along the longitudinal channel, the drive being effected by friction between the two cables and the bundles; (2) a single-cable accelerator for moving the bundles along the rafting lanes branching out from the main channel, and (3) CL-2 winches for towing the raft sections built in the rafting lanes.

1678. ČESNOKOV, V. A. Pereoborudovanie mašiny VKF-16 dlja splotki ozernyh pučkov. **[Adaptation of the VKF-16 machine for making lake-going bundles.]** *Lesn. Prom.* 14 (4), 1954 (25–7). [Russ.] L.S.

Describes the modifications introduced into the VKF-16 bundling machine to enable it to produce lake-going bundles of 30–40 cu.m. with a height/width ratio of 1·5–1·75.

1679. PANTELEEV, V. V. Ruslovypraviteljnye razborno-zvenjevye sooruženija na r. Ude. **[Booms with movable trestle supports for correcting river beds, used on the R. Uda.]** *Lesn. Prom.* 14 (6), 1954 (23–5). [Russ.] L.S.

[Cf. *For. Abstr.* 15 (No. 1446).] The same trestle supports were used with success in the Uda (Buryat-Mongolian ASSR).

1680. KUZNECOV, V. V. Mehanizirovannaja pogruzka korotjja v suda. **[Mechanized loading of short logs into water craft.]** *Lesn. Prom.* 14 (8), 1954 (26–8). [Russ.] L.S.

Illustrated description of an improved grab for loading bundles of floated logs on to boats by means of cranes.

38. Forest Engineering

382. Buildings. Logging Camps etc.

1681. GUISCAFRÉ, J. Type de maison pour agent forestier. **[A [wooden] house suitable for a forest officer [in the tropics].]** *Bois For. Trop.* No. 44, 1955 (31–5). [F.]

The house can be built very quickly, does not need skilled carpenters, and costs only half as much as a similar stone-built house.

383. Roads and Bridges

1682. ROWBOTHAM, E. R. **The design and construction of the Humming Bird Highway.** *Roy. Engrs.' J.* 69 (4), 1955 (358–73).

Describes the planning and construction of a road some 32 miles long, through dense forest in British Honduras, with an account of equipment and costs. The road, scheduled for completion in 1955, will carry timber and other heavy loads.

1683. SCHALTENBRAND, W. Considérations sur l'évolution des techniques de construction de routes forestières et réalisation d'un type forestier moderne dit: 'compactage aux composols'. **[The evolution of techniques of forest road making, with particular reference to tarmacadamizing.]** *Schweiz. Z. Forstw.* 106 (11), 1955 (617–33). 8 refs. [F.g.]

Gives detailed descriptions of methods of making a tarmacadamized forest road, and of modernizing existing roads, together with some indication of costs.

1684. ERIKSSON, R. Den snöpackade vägen. I. Snöns egenskaper. **[The compacted snow road. I. Properties of snow.]** *Svenska SkogsvFören. Tidskr.* 52 (2), 1954 (157–88). 32 refs. [Sw.sw.e.]

The elementary physical properties of ice, water, and vapour, and the structure, changes as a result of compaction, and strength, of snow are discussed. Measurements on the bearing capacity of snow at intervals after various treatments showed that, with all treatments, bearing capacity increased with the period of time, and possibly with falling temperature. Compaction by crawler-tractor followed by dragging with a special road-drag gave the highest, and by crawler-tractor alone the lowest, bearing capacity. The bearing capacity and resistance to wear can be improved by closer packing down and by strengthening the union between the snow particles, e.g. by crushing the particles more thoroughly, mixing fine and coarse-grained snow or by compaction at higher temperatures. Tables, graphs and illustrations have English legends.

1685. KEMPPAINEN, U. Hevospolannetiekalustosta. **[Equipment for constructing snow-packed logging roads when hauling by horses.]** *Teho, Helsinki* 1955 (10/11), (655–8, 731, 732). [Fi.sw.e.]

Discusses experiments by the Kajaani Co. on using snow-packed roads, and some of the equipment [illustrated] used for making them. *From author's summary.*

1686. BLIZNECOV, N. V. Mehanizacija polivki avtoledjanyh dorog. **[Mechanization of watering ice roads.]** *Lesn. Prom.* 14 (9), 1954 (17–8). [Russ.] L.S.

Illustrated description of an appliance comprising a large water tank mounted on a lorry, and a special watering device heated by exhaust gases.

1687. REĬNAS, P. D., and TEFANOV, I. A. Ščitoukladčik dlja avtomobiljnyh dorog. **[Plank-laying machine for lorry roads.]** *Lesn. Prom.* 14 (3), 1954 (14–6). [Russ.] L.S.

Illustrated description of a machine capable of (1) hoisting and loading on itself 9 pairs of triple planks similar to those described previously [see *For. Abstr.* 15 (No. 1452)], (2) transporting them over a short distance, and (3) laying them evenly on the ground. It is claimed that 9 pairs of triple planks (equivalent to 58·5 m. of the road) can be laid in 20–25 min.

1688. PANCER, A. V. Plužnyĭ snegoočistitelj. **[Snow plough.]** *Lesn. Prom.* 14 (11), 1954 (12–4). [Russ.] L.S.

Detailed illustrated description of the snow plough, mounted on the DT-54 tractor, and of its

operation. It removes snow up to 60 cm. deep. The plough shares, set at 70° to each other, are lifted and lowered by means of a winch mounted at the rear of the tractor.

384. Protective Works

See also No. 1546.

1689. **Avalanche and torrent control in the Spanish Pyrenees.** *Unasylva* 9 (3), 1955 (111–3).

1690. Garavel, L. Éléments pour l'étude des projets de travaux contre les avalanches. **[Basic points in the study of protective works against avalanches.]** *Ann. Éc. Eaux For., Nancy* 14 (2), 1955 (221–60 + 16 photos). 9 refs. [F.e.g.]

Distinguishes between defence works aimed at slowing down movement and minimizing damage, and preventive works based on study of snow formation and movement.

4. FOREST INJURIES AND PROTECTION

See also Nos. 1299, 1301–3, 1307, 1310.

1691. Bärner, J. [Compiler.] Bibliographie der Pflanzenschutzliteratur 1951. **[Bibliography of plant protection literature for 1951.]** Biologische Bundesanstalt fur Land- und Forstwirtschaft, Berlin-Dahlem. 1955. pp. xliv + 420.

A classified, world-wide title list (> 12,500 entries) with author index, covering plant injuries by all agencies (non-parasitic; plant and animal parasites) and protection against them. Introductory matter and headings of sections are given in German, English and French.

1692. **Some forest insect and disease problems of Canada.** Forest Biology Division, Department of Agriculture, Canada. 1955. pp. 30.

An illustrated extension pamphlet.

1693. Cornelius, R. O. **How forest pests upset management plans in the Douglas Fir region.** *J. For.* 53 (10), 1955 (711–3).

A review of the effects of root rot, windthrow, beetle and budworm epidemics, etc. on logging and road development plans. The need for flexibility in fixing yield; watch on overmature stands; annual reconnaissance; permanent transects to note mortality trends; ready plans for control, salvage and sanitation; biological research; prevention; and co-operation are emphasized.

42. Injuries from Inorganic Agencies other than Fire

421. Air Currents

See also No. 1326.

1694. Foltánek, V. Polomová kalamita v lesním středisku Roudno SLH Šternberk. **[Wind damage in the Roudno range of the Sternberk forestry undertaking.]** *Lesn. Práce* 34 (8), 1955 (363–70). [Cz.]

Describes the wind breakage and windthrow of 17th Jan. 1955, involving ca. 35,000 cu.m. of timber on an area of 1450 ha. of natural forest. The main species was Spruce. Recommends some silvicultural measures (mainly felling techniques) to prevent or minimize such damage.

422. Temperature Influences. Frost. Heat. Drought

See also Nos. 1209, 1325, 1451, 1748, 1825–6.

1695. Schubert, G. H. **Freezing injury to young Sugar Pine.** *J. For.* 53 (10), 1955 (732). 1 ref.

Compares the resistance to freezing of nursery and field planted and sown stock of *Pinus lambertiana* (most susceptible) with *P. ponderosa* and *P. jeffreyi*, and gives figures showing the protection from frost afforded by rodent-excluding wire screens.

424. Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.

See also Nos. 1496, 1715–7, 1825–6.

1696. Galazii, G. I. Botaničeskiĭ metod opredelenija dat vysokih istoričeskih gorizontov (VIG) vody i nekotoryh drugih javleniĭ na Baĭkale. **[A botanical method of dating high water levels and some other phenomena in Lake Baikal.]** *Dokl. Akad. Nauk SSSR* 103 (5), 1955 (811–3 + tbl.). 5 refs. [Russ.] A.P.B.

Describes and illustrates a method of dating based on: (1) formation of reaction wood in trees caused to lean by flooding and root-washing; (2) formation of vertical epicormic shoots on stems similarly caused to fall to a more or less horizontal position; (3) cambial injuries from moving shingle etc.; and (4) in areas beyond wave action, reduction of radial growth owing to submergence of the root system.

1697. Woods, R. V. **Salt deaths in *Pinus radiata* at Mount Crawford Forest Reserve, S.A.** *Aust. For.* 19 (1), 1955 (13–9). 4 refs.

Drought deaths on shallow soils have been a feature of the forest during arid cycles deficient in winter rainfall. These sites have been free of deaths since 1952. Deaths have, however, occurred more or less continuously since early 1952 in gullies, soaks, and flats throughout the forest, mostly in very vigorous forest equalling the best development of *P. radiata* in the Adelaide Hills. Analysis of foliage samples indicates significant amounts of chloride, the upper limit of apparently unaffected needles being 0·5% chloride. Affected foliage has a characteristic scorched appearance due to browning or death of the needle tip. Affected trees cover a range of ages from 5 to 39 years over several geological formations with various aspects, and the conclusion is that there has been a climatic upset. Rainfall data indicate a very high water-table in 1951, one condition necessary to salt uptake. Abnormal salt concentration in that water-table has been possibly caused by three factors concentrating the annual accession of cyclic [oceanic] salt that is present in all the rainfall over southern

Australia. Other factors may have been contributory. The 'accident' of early 1952 appears to be a coincidental combination of several factors that may never occur again. Similar deaths in all the forest reserves of the Adelaide Hills indicate the widespread nature of the climatic upset and the necessity for further investigation. Afforestation schemes on poorly drained country near the coast of southern Australia may well have to consider the relation between ever-present cyclic salt and fast-growing conifers, the large water requirements of which tend to exert a concentrating effect upon that salt in the soil water. *From author's summary.*

1698. BJÖRKMAN, E. Om 'granens gulspetssjuka' i plantskolor. **[The 'yellow-tip disease' of Spruce in nurseries.]** *Svenska SkogsvFören. Tidskr.* 51 (3), 1953 (211–29). 25 refs. [Sw.e.]

A more detailed account of research already reported [see *For Abstr.* 16 (No. 596)]. Soil analyses, applications of P and the establishment of trial plots before laying out nurseries on arable land are recommended.

1699. TAMM, C. O. Mera om granens gulspetssjuka. **[More on the 'yellow-tip disease' of Spruce.]** *Svenska SkogsvFören. Tidskr.* 51 (4), 1953 (390–6). 4 refs. [Sw.e.]

Needles from the previous year's shoot were analysed from a number of healthy plants and those with yellow-tip disease from districts in central and S. Sweden. Late autumn is considered the best time for needle analysis. In all but one of the samples from yellow-tipped plants, the K/Ca ratio was low (0·3–0·5 as against 0·8–2·4 for healthy plants). The single exception showed a fairly high ratio of 1·5, as against 0·9 for healthy seedlings on the same site; both healthy and yellow-tipped plants on this site had a very low Mn content —2–3 p.p.m. Some observations by the author in Sweden in 1950 and some made by Němec in Czechoslovakia in 1938 [see *For. Abstr.* 3 (p. 71)] suggest that an unsuitable K/Ca ratio may cause disease in older trees.

425. Chemical Influences (Atmospheric)

See also No. 1299.

1700. SCHEFFER, T. C., and HEDGCOCK, G. G. **Injury to northwestern forest trees by sulfur dioxide from smelters.** *Tech. Bull. U.S. Dep. Agric.* No. 1117, 1955. pp. 49. 20 refs.

Studies were made of two forest areas affected by SO_2 from large ore smelters. The chief criterion of injury was the typical leaf markings. Several species of broadleaved shrubs, notably *Physocarpus capitatus*, were very susceptible and, owing to their ubiquity, served as a useful indicator species. Criteria for distinguishing SO_2 injury from winter injury are given. Insect attack was not noticeably increased in affected areas. Parasitic fungus diseases were no more prevalent than in unaffected areas, in fact a number of needle and leaf fungi, including several rusts, appeared to be retarded or inhibited, especially where SO_2 injury to trees and shrubs was greatest. Assays of foliage confirmed earlier findings that the presence of SO_2 results in abnormal accumulations of S, but it is apparently the rate, not the amount, of S entering the leaf that determines the occurrence of injury. Lists are given of trees, shrubs, and herbs in order of observed susceptibility to SO_2. Evergreen coniferous trees are generally more severely injured than deciduous trees, and they may be injured by fumes in winter when temperatures are above 40° F. Western Larch is the most susceptible species when its needles are young, but has superior survival capacity as a deciduous species. In experiments with artificial fumigation, it was shown that the minimum concentration of SO_2 that will injure conifer seedlings is 0·25 p.p.m. The reduction of coniferous reproduction in affected areas is ascribed partly to this susceptibility and partly to reduced cone crops. Ponderosa Pine saplings were reduced in vigour and killed in increasing numbers during years of heaviest fumigation, and considerably larger trees (i.e. about pole size) were similarly affected, indicating that increased maturity did not connote greater tolerance to SO_2. A small proportion of sapling and larger Ponderosa Pines remained in good condition through the years of heaviest fumigation. Douglas Fir was, on the whole, more susceptible than Ponderosa Pine and no individuals remained unaffected. Height and diameter increment of Ponderosa Pine were both reduced where there was visible injury to the tree. Eighteen years after the initiation of SO_2 abatement measures in the Columbia River Valley area of study, there was no evidence of current injury to timber or plants. *From authors' summary.*

1701. GRÜLL, H. Rauch- und Flugstaubschaden. **[Smoke and smoke-particle injuries.]** *Zbl. ges. Forstw.* 73 (4), 1955 (234–47). 3 refs. [G.g.]

Investigations into the relative damage done by smoke gases—(in effect, SO_2) and by solid components (e.g. soot and metal particles) to Spruce, showed that only very heavy deposits permitted conclusions on the extent of gas injury. With lesser deposits no significant correlation was found. The deposits appeared to have no corrosive effects on the needles.

43. Forest Fires

431. Predisposing Factors and Causes. Fire Danger. Fire Behaviour

1702. HILL, R. R., and BOEKER, E. L. **Hunting seasons and forest fires in Colorado.** *J. For.* 53 (10), 1955 (707–10).

Gives the basic data on hunter fires, hunting conditions and the effect of postponing the opening date (15 Oct.) of the season from the points of view of forest and wildlife protection, the interests of 100,000 hunters, and the associated industries. Most of the elk, and half the deer, killed, are hunted on 14 million acres of national forest.

1703. **Sunshine, slash and hazard sticks.** *Protect. Bull. B.C. For. Serv.* No. 4, 1955. pp. 4.

Shows how equilibrium fuel-moisture content varies with both relative humidity and temperature, e.g. at r.h. 40% and 80° F., fuels shaded from the

sun will have a m.c. of 7·6%, but fuels at 110° in air of 16% r.h. will have a m.c. of only 3%. Since very little fuel is exposed to full sun in B.C. forests, it is suggested that fuel-moisture sticks should be exposed under full shade.

432. Prevention and Control

1704. DIAS, A. BELIO. Elementos para a organização da defesa contra fogos no Património Florestal (Apontamentos de extensão às propriedades particulares). [**Basic factors in the organization of fire protection in the Forest Service (with notes on its extension to private property).**] *Estud. Inform. Serv. flor. aqüic. Portugal* No. 52-E6, 1954. pp. 141 + 25 plates + 8 tbls. 45 refs. [Port.] Limited distribution.

1705. **[Forest fire protection in Canada.]** *Pulp Paper Mag. Can.* 56 (10), 1955 (148 . . . 196).

A symposium of 11 articles covering public relations, federal research, protection in New Brunswick and Quebec, the use of the Canadian army, the use of planes, helicopters and parachutes (Ontario and Saskatchewan), forest fire pumps and the provision of food to fire-fighters.

1706. **High pressure pumps for fire fighting.** *Aust. Timb. J.* 21 (8), 1955 (753).

A 700-gallon steel tank is mounted on a 3-ton Chevrolet long-wheel-base truck. The pump is a 12-h.p. 3-cylinder displacement orchard spray type capable of pressures of 400–600 lb. The tank can be refilled in 12 min., the rate of discharge being about 12 gal./min. per nozzle. The high-velocity spray is most effective up to 60 ft. on vertical timber or 70 ft. horizontally on grass. Seating and equipment accommodation for fire-fighters is provided on the truck.

1707. MACTAVISH, J. S. **Slip-on tankers for forest fire suppression.** *Tech. Note For. Br. Can.* No. 12, 1955. pp. 12. 4 refs.

Describes types of tank and of truck, equipment, and maintenance.

1708. **Laying out water hoses by helicopter.** *For. Equipm. Note, FAO* No. *E.* 6.55, 1955. pp. 1.

Successful tests have been carried out in Ontario, Canada, using a helicopter for unrolling a flexible hose over wooded terrain. The hose (38 mm. diam.), in connectable 100-m. sections, was placed aboard the helicopter in a bag, its end being attached to a pump at the water-supply source. It was then paid out by hand above a forest with trees ca. 20 m. high.

433. Salvage and Disposal of Fire-damaged Timber

See also No. 1804.

1709. KIMMEY, J. W. **Rate of deterioration of fire-killed timber in California.** *Circ. U.S. Dep. Agric.* No. 962, 1955. pp. 22.

Gives data on the rates of decay of fire-killed *Abies concolor, Pinus ponderosa, P. jeffreyi, P. lambertiana* and *Pseudotsuga taxifolia.* There is little deterioration in the first year, during the 2nd year bluestain and incipient decay occur in much of the sapwood, and by the end of the 3rd year practically none of the sapwood is salvable. Insect damage seldom causes cull before fungi have rendered the wood useless.

1710. WAGENER, W. W. **Preliminary guidelines for estimating the survival of fire-damaged trees.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 98, 1955. pp. 9. 5 refs.

Preliminary conclusions from a survey in progress in California since 1939 are that the most important factors to be considered in assessing probability of survival are: season of fire, age and vigour of tree, bud kill (especially in Ponderosa and Jeffrey Pines) and foliage kill, cambium injury, and amount of insect damage. Marking should not be done much in advance of logging. A two-stage logging is desirable, removing first the completely dead trees, especially Pines, since they are liable to stain-degrade affecting the value of the product.

434. Revegetation etc. of Burnt Areas

See No. 1603.

435. Benefits of Fire Control. Injurious Effects of Fire. Fire Losses

See No. 1887.

436. Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry

See also Nos. 1164, 1432, 1435, 1627, 1734.

1711. PLOWES, D. C. H. **Veld burning—how, why and when.** *Rhod. agric. J.* 52 (5), 1955 (380–94). E.M.B.

A discussion of the problems involved, with some practical recommendations.

1712. KALLANDER, H. R., WEAVER, H., and GAINES, E. M. **Additional information on prescribed burning in virgin Ponderosa Pine in Arizona.** *J. For.* 53 (10), 1955 (730–1). 2 refs.

[Cf. *For. Abstr.* 14 (No. 1297).] Shows in discussion and in a comparative table the continuing advantageous effects of the 1950 burn. That season's weather conditions (for economy and effectiveness in results) would be paralleled by only 5 years of the 45 years recorded and of these 3 would have been inferior for the reduction of heavy fuels.

44. Damage by Harmful Plants. Virus Diseases

441. Weeds

See also No. 1322.

1713. ROE, E. I. **Forest plantation release: what it is—how to do it.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 33, 1955. pp. 29.

Describes mechanical and chemical methods of controlling grass and herbs, shrubs, and overtopping trees and shrubs, with details of the equipment and some photographs of tools.

Weeds: Chemical Control

See also Nos. 1463, 1491, 1576–7, 1626, 1713.

1714. ANDRE, F., and HARTIG, W. Über die Keimfähigkeit von Coniferensamen in mit Dikopur behandelten Böden. (1. Mitteilung.) **[On the germination capacity of conifer seeds in soils treated with Dikopur. (1st communication).]** *Zbl. ges. Forstw.* 73 (1/2), 1954 (73–5). [G.g.]

Germination %s of Spruce and Larch seeds sown in sand from 1 to 6 weeks after its treatment with a strong solution of Dikopur [an Austrian 2,4-D preparation] were not significantly affected, and even increased in some cases compared with controls. A small reduction was found for Scots Pine.

1715. WOODS, F. W. **Karmex W persists in sandhill soils.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 94, 1954 (2–3).

In NW. Florida sandhills, even a small dose of the herbicide (formerly called CMU), severely injured Slash Pine seedlings planted 9 months later; a heavy application killed or injured 76% of Pines planted 2 years later. Scanty rainfall and lack of active micro-organisms in the sandy soil are adduced in explanation.

1716. WOODS, F. W. **Tests of CMU for forestry.** *For. Sci.* 1 (3), 1955 (240–3). 9 refs.

Mortality of scrub Oaks (*Q. laevis* and *Q. incana*) and grass in the sandhills of S.W. Florida when CMU (3-(*p*-chlorophenyl)-1,1-dimethyl-urea) is applied at rates of 0–37 lb./acre are shown in graphs. Oaks were controlled by 11 lb. and grasses by 22 lb./acre. *Pinus elliottii* planted in these soils 9 months after the treatment showed 24% mortality or severe injury in areas treated with 4 lb. and 98% in areas treated with 37 lb./acre. The value of this chemical in forestry is therefore doubtful.

1717. WOODS, F. W. **Tests of a soil sterilant [CMU] for forestry use.** *Science* 122 (3164), 1955 (332). O.R.S.

Cf. preceding abstract.

1718. ROE, E. I. **Aerial brush control in Lake States forests.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 37, 1955. pp. 9. 3 refs.

Comments briefly on trials in the Lake States since 1951, and discusses the advantages and disadvantages of aerial spraying and its possible use for releasing young conifer plantations, preparing sites for planting, clearing low-grade Aspen, encouraging natural regeneration by conifers and creating conditions favourable for wildlife, giving some examples of experiments on these lines.

1719. KOHLER, M. Die Bekämpfung der Grünerle (*Alnus viridis* Lam. u. DC.) auf Alpweiden mit Wuchsstoffmitteln. **[Control of *A. viridis* on mountain pastures with growth regulators.]** *Schweizerische Landwirtschaftliche Monatshefte, Bern* 32 (9/10), 1954 (372–8). 7 refs. [G.g.] L.S.

In small-scale trials on a pasture at 1100 m. alt. near Riffenmatt, Switzerland, of summer spraying with 2,4-D and 2,4,5-T alone and in mixtures, all in water, the Alders were apparently killed, no regrowth having occurred in the last 2 years. Esters were more effective than Na salt of 2,4,5-T. Costs even with low concentrations (0·75%) were high.

1720. MCMILLAN, F. W., MCKIBBEN, G. E., and BOGGESS, W. R. **Controlling Sassafras, Persimmon and Elm with 2,4,5-T and mixtures of 2,4,5-T and 2,4-D.** *For. Note Ill. agric. Exp. Sta.* No. 58, 1955. pp. 5.

Sprays of (*a*) 2,4,5-T and (*b*) 2,4,5-T + 2,4-D applied by power and hand sprayers, at rates of 8 lb./100 or 150 gal. fuel oil for (*a*) and 5 lb./100 or 150 gal. fuel oil for (*b*), were tested on an abandoned old-field area. All treatments gave satisfactory results on *Sassafras albidum* and *Ulmus* sp. The higher concentration of 2,4,5-T is recommended for *Diaspyros virginiana*. Hand spraying, though slower, was more effective than power spraying.

1721. MCMILLAN, F. W., MCKIBBEN, G. E., and BOGGESS, W. R. **Results of 2,4,5-T applications in Sycamore and Willow.** *For. Note Ill. agric. Exp. Sta.* No. 60, 1955. pp. 2.

A solution of 8 lb. acid equivalent of 2,4,5-T in 100 gal. fuel oil, applied as a basal spray in the autumn, gave an almost complete kill of *Platanus occidentalis*. *Salix nigra* did not respond well to 2,4,5-T and most of those killed were single-stemmed: the herbicide had little effect on multiple-stemmed clumps.

1722. **Tree poisoning studies [in S. Rhodesia].** *Annual Report, Grasslands Agricultural Research Station, Marandellas 1952/53*, [1953?] (55–6). A.P.B.

Brachystegia spiciformis and *Julbernardia* [*Isoberlinia*] *globiflora* were treated with 2,4-D and 2,4,5-T esters, and a mixture of both, in diesel oil, with diesel oil only, and with As_2O_3 applied either to cut stumps, to frills, or to basal bark, at 4 different seasons beginning with July 1952 (concentrations given). Two series of foliage spraying with 2,4-D and 2,4,5-T were also made, and were promising. As_2O_3 applied to cut stumps and frills proved the most effective; 2,4,5-T, alone or mixed with 2,4-D, caused quick defoliation and poor growth of new foliage; 2,4-D had little immediate effect, but the new leaf growth was poor or distorted. Final assessment should be deferred at least a year from the date of the last application.

442. Parasitic Higher Plants. Climbers and Epiphytes

1723. BOURCHIER, R. J. **New host relationships for fungus parasites of the Lodgepole Pine mistletoe [in Alberta].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (2).

Walrothiella arceuthobii was found attacking *Arceuthobium americanum* on *Picea glauca*; *Septogloeum gillii* was found attacking the same host on *Pinus banksiana*. Both parasites had hitherto been found only on Mistletoe growing on Lodgepole Pine.

1724. SINGH, B. **Studies in the family Loranthaceae. List of new hosts of *Dendrophthoe falcata* (L.f.) Ettings, its relations with hosts, the anatomy**

of its seedling and mature haustorium. *Agra University Journal of Research* (*Science*), *Agra* 3 (2), 1954 (301–15). 25 refs. H.S.B.

Timber trees among the 34 new hosts listed include *Pinus longifolia*, *Shorea robusta* and *Swietenia macrophylla*.

443. Fungi and Bacteria

1725. MURRAY, J. S. **Rusts of British forest trees.** *Bookl. For. Comm., Lond.* No. 4, 1955. pp. 15. Price 2*s.* 6*d.*

Arranged in alphabetical order of fungi, and illustrated by 12 photographs (10 in colour). There is summary table giving tree host, part affected, and symptoms for each species.

1726. AXMANN, N. J. Donnerbusch und Hexenbesen. [**Witches' brooms.**] *Holz-Zbl.* 81 (146), 1955 (1743). [G.]

Describes and illustrates a number of these, chiefly on Pine, their role in folklore and some of the causative fungi.

Fungi and Bacteria: Natural and Biological Control

1727. WOOD, R. K. S., and TVEIT, M. **Control of plant diseases by use of antagonistic organisms.** *Bot. Rev.* 21 (8), 1955 (441–92). 190 refs. [Imperial College, London.]

A review of literature (chiefly in English), not intended to be comprehensive, but to cover all major work on the possibility of controlling fungus diseases by such means.

Fungi and Bacteria: Chemical Control (General)

See also Nos. 1505–10, 1741–2.

1728. AMMANN, A., GOTTLIEB, D., BROCK, T. D., CARTER, H. E., and WHITFIELD, G. B. **Filipin, an antibiotic effective against fungi.** *Phytopathology* 45 (10), 1955 (559–63). 7 refs.

Gives the method of extraction and properties of this compound, isolated from *Streptomyces filipensis*, which inhibits a wide variety of fungi parasitic both on plants and animals. The inhibitory concentrations for 28 of these is given. Among them are damping off, wilt and blight (*Endothia parasitica*) organisms of forestry interest. [Cf. *For. Abstr.* 16 (No. 4215).]

1729. KRASILJNIKOV, N. A., KUČAEVA, A. G., MIRZABEKJAN, R. O., and NIKITINA, N. I. Vsasyvanie i raspredelenie antibiotikov v rastenii pri vnekornevom ih vvedenii. [**Absorption and distribution in the plant of antibiotics introduced by injection.**] *Dokl. Akad. Nauk SSSR* 102 (2), 1955 (375–8). 3 refs. [Russ.] A.P.B.

Gives data from experiments on the absorption and distribution of solutions of antibiotics (mainly penicillin) injected into the stems of various ornamental and fruit trees. Distribution was verified by microbiological tests of samples from different parts of the crown, against *Staphylococcus aureus* and *Bacillus subtilis*.

1730. ZENTMYER, G. A. **A laboratory method for testing soil fungicides with *Phytophthora cinnamomi* as test organism.** *Phytopathology* 45 (7), 1955 (398–404). 10 refs.

A 2-phase laboratory method is described for selecting effective soil fungicides. Materials were tested in glass vials containing 2 in. of autoclaved soil, with an inoculum disk placed at a depth of 1 in. Chemicals were applied (1) as drenches or (2) as dry mixes with the soil. Inoculum was recovered after a 24-hour incubation period, and placed on agar in Petri dishes to determine viability. The principal test fungus was *Phytophthora cinnamomi*. *Verticillium albo-atrum* was also used to a limited extent. Many chemicals that are highly fungicidal on the basis of standard laboratory testing methods were ineffective when applied as drenches to soil. Only 10 of the 47 chemicals tested by the drench method penetrated 1 in. of soil in fungicidal concentration when applied to give a dosage of 500 p.p.m. The 2 most effective materials were sodium methyldithiocarbamate (Stauffer N-869 or Vapam) and tetrahydro-3,5-dimethyl-2*H*-1,3,5-thiadiazine-2-thione (Stauffer N-521), which were fungicidal at 5 p.p.m. The 4 most effective fungicides in the dry-mix test were 3-[2-(3,5-dimethyl-2-oxocyclohexyl)-2-hydroxyethyl]glutarimide (Acti-dione), ethylmercury phosphate (Ceresan, New Improved), Stauffer N-869, and Stauffer N-521, which killed *P. cinnamomi* at 5 p.p.m. Several chemicals that were ineffective in soil when applied as drenches, were fungicidal in the dry-mix test, where penetration of soil is not a factor. Materials that were fungicidal in the laboratory drench test also killed *P. cinnamomi* in soil in glasshouse tests. Materials selected as effective fungicides in screening tests in agar varied greatly in their performance in soil. Striking differences were noted in the fungitoxicity of closely related compounds. Sodium methyldithiocarbamate was approximately 500 times more fungicidal than sodium dimethyldithiocarbamate or sodium diethyldithiocarbamate. Other examples are presented of similar relationships between structure and biological activity. *Author's summary.*

1731. VAARTAJA, O. **Chemotherapeutic action of dibenzothiophene against *Rhizoctonia solani*.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (2).

Seeds of *Pinus banksiana* were sown on germination media consisting of the following chemicals dispersed in 1·2% agar: (*a*) 0·005% Panogen (2% methyl mercury dicyandiamide), (*b*) 0·05% dibenzothiophene, (*c*) 0·05% fluorene, (*d*) 0·05% Tersan (75% thiram), (*e*) 0·05% Orthocide (75% captan), (*f*) 0·05% Fermate (7·6% ferbam), and (*g*) control with no chemicals added. The 10 best seedlings were left to grow in each jar and, when the cotyledons were fully developed, a piece of agar containing *Rhizoctonia* mycelium was placed in the top of each seedling. After 2 weeks, survival (% averages of 5 replications) was as follows: (*a*) 8, (*b*) 100, (*c*), (*d*) and (*e*) 2 each, (*f*) and (*g*) 0. Two weeks later, survival with (*b*) was still 96% while it was nil with all other treatments. It is considered probable that the high protection afforded by the

dibenzothiophene may have been of a chemotherapeutic nature, changing the metabolism of the plant towards greater resistance.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 1478, 1492–3, 1505–11, 1730–1.

1732. SALISBURY, P. J. **Parasitism of *Phytophthora* spp. isolated from root rots of Port Orford Cedar in British Columbia.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (3–4).

Phytophthora lateralis, *P. cinnamomi* and two unknown species of *Phytophthora* have been found in association with root rots of *Chamaecyparis lawsoniana* in British Columbia nurseries. *P. cinnamomi* has also been isolated from root rots of English Yew and Rhododendron.

1733. AKAI, S., and TAKEUCHI, T. **[On damping-off disease of some coniferous seedlings caused by soil-inhabiting fungi.]** *Annals of the Phytopathological Society of Japan, Tokyo* 18 (3/4), 1954 (122–4). 8 refs. [Jap.e.] H.S.B.

Investigates the susceptibility of young seedlings of *Pinus densiflora*, *P. thunbergii*, *Cryptomeria japonica* and *Chamaecyparis obtusa* to *Pythium ultimum*, *Fusarium* spp., and *Rhizoctonia* spp. It was highest in *P. densiflora*, particularly under moist conditions, when the infection rate for *Rhizoctonia*, which proved the most dangerous for all seeds and seedlings tested, was ca. 90%. Large [vigorous] three-months-old seedlings, however, were not infected. *From author's summary.*

1734. DAVIS, V. B. **Don't keep Longleaf seed trees too long!** *Sth. For. Notes Sth. For. Exp. Sta.* No. 98, 1955 (3).

When some 3-year-old Longleaf Pine seedlings were burned to control brown-spot needle blight [caused by *Scirrhia acicola*], it was found that seedling mortality was highest close to the over-storey Pines, where seedlings were smaller and heavy needle-cast added to the fuel supply.

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also Nos. 1256, 1261, 1577.

1735. RUBERU, T. R. A. **Note on a wood-rotting fungus on Sapu [*Michelia champaca*], *Favolus ciliaris* Mont.** *Ceylon For.* (*n.s.*) 2 (2), 1955 (80–4 + 1 plate). 4 refs.

Describes a successful attempt to cultivate the fungus in artificial media.

1736. MARSHALL, R. P. **A possibly unreported host of *Polyporus squamosus*.** *Sci. Tree Top.* 2 (1), 1953 (12–3).

P. squamosus, which commonly causes a white heart-rot in Elm, was collected from a pruning wound on *Juglans nigra*.

1737. BAKSHI, B. K. **Diseases and decays of conifers in the Himalayas.** *Indian For.* 81 (12), 1955 (779–97 + 4 plates + 10 sets of drawings). 32 refs.

Describes root rots caused by *Fomes annosus*, *F. pinicola*, *F. robustus*, *Armillaria mellea* and *Polyporus tomentosus*, and heart rots caused by *Lenzites sepiaria*, *L. striata*, *L. subferruginea*, *Poria monticola* *P. rixosa*, *Polyporus schweinitzii* and *Fomes roseus*.

1738. ARVIDSON, B. En studie av granrotrötans (*Polyporus annosus* Fr.) ekonomiska konsekvenser. **[A study of the economic effects of *Fomes annosus* in Norway Spruce.]** *Svenska SkogsvFören. Tidskr.* 52 (4), 1954 (381–412). 15 refs. [Sw.e.]

In an investigation over 5 years on sample plots on the Skinnskatteberg experimental area in Västmanland, trees (55–90 years old) were classified into 4 groups (sound, or with rot involving $< 25\%$, 25–75% or $> 75\%$ of stump diameter) and were marked into lengths (1) disregarding and (2) according to, the decay present. The average difference between stumpage value by the two methods of marking off was about 20–30%. There were also considerable differences in the assortments obtained (sawtimber, pulpwood and fuelwood), by the two methods. During the investigations it was observed that decayed trees frequently had the same d.b.h. as sound trees but invariably showed poorer diameter and height increment, greater taper, and lower production generally than sound trees. To obtain further information on this secondary damage by *F. annosus*, a further investigation was carried out by analysis of increment cores from different heights on 87 sound and 60 decayed trees on a sample strip in a 65-year-old stand at Laggarbo, in the same area. Results show for the period 1917–52 that (1) diameter increment of sound trees was above that of decayed trees throughout the period at heights of 130 and 300 cm., although at 30 cm. it was lower or roughly the same until about 1934 when it began a steady increase over that of decayed trees; (2) taper was greater in decayed trees throughout the period and at all boring heights; (3) diameter of decayed trees at 30 cm. was higher throughout the period although by 1952 the curves were very close together, at 130 cm. was greater until 1934 when the curves crossed, and at 300 cm. until 1925. Conclusions drawn are that increment and stem form are greatly impaired by the rot, that it tends to attack the fast-growing trees and that it reduces increment above stump height from a very early stage in the attack. In the same stand, the value of sound trees was calculated from actual development, and that of decayed trees on actual and on estimated development, assuming for the latter that increment of these trees if they had not been attacked would have run parallel with and rather above that of the sound trees. On this basis the loss in stumpage value in 1952 by secondary damage is calculated at Kr.1837/ha. and by primary damage (the difference between the two methods of marking off) at Kr.1368/ha. The results are considered in their relationship to the Swedish law controlling fellings of stands capable of further profitable growth. Tables and graphs have English legends.

1739. RATTSJÖ, H., and RENNERFELT, E. Värdeförlusten på virkesutbytet till följd av rotröta. **[Losses of value in timber output as a result of butt**

rot.] *Norrlands SkogsvFörb. Tidskr.* 1955 (3), (279–98). 7 refs. [Sw.sw.e.]

Four small plots, each about 0·1 ha. in area, containing mainly Spruce, were clear felled, and the trees were marked for cross-cutting, (1) as if all timber were sound and (2) with reference to the rot present. The values for timber and sulphite and sulphate pulpwood were calculated on the basis of prices in 1952–53. The loss in value for the different plots ranged from 11·3 to 32·7% and the loss in volume from 7·3 to 19·6%. Rot was present mainly in the butt and much of the loss was in cull butts; loss caused by degrading to pulpwood was comparatively slight. *Fomes annosus* and *Armillaria mellea* were responsible for 82 and 8% respectively of the decay present.

1740. JANČAŘÍK, V. Současné způsoby boje proti václavce. **[Contemporary methods of controlling *Armillaria mellea*.]** *Lesn. Práce* 34 (8), 1955 (351–8). [Cz.]

Discusses the various methods (biological, mechanical, chemical) from the point of view of their merits and applicability in Czechoslovakia.

1741. FERNANDEZ, C. La lutte contre la maladie de l''encre' au nord du Portugal et les recherches faites pour arriver à des procédés plus efficients et économiques. **[The control of *Phytophthora* disease of Chestnuts in the north of Portugal, and research to discover cheaper and better methods.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955*, No. *FAO/CH*/15-*F*, 1955. pp. 6. [F.] Limited distribution.

A summary account (with tabulated data) of the number of trees treated and costs of treatment between 1945 and 1954, during which a total of 73,475 trees were treated either for prevention or for cure. Only some 1–5% failed to respond favourably, but costs were high, and studies are in progress to find an improvement on the current method [apparently excavation of the roots and application of a Cu compound]. Promising results were obtained by applying the fungicide to the surface of the ground and digging it in with a spade over the area covered by the tree crown. Results of laboratory experiments are tabulated and discussed, using the following (1) $CuCO_3$ (20% Cu); (2) a 1/2 mixture of 'Sandoz' (50% Cu) and gypsum; (3) a 1/1 mixture of Sandoz and gypsum; (4) Sandoz; (5) a 2/1/2 mixture of $CaCO_3$, Sandoz, and gypsum; (6) 'Cuivre Ultra' (52% Cu); 'Cuproxidul Ultra' (80% Cu); (8) 'Vitigran' (56% Cu); all of which gave good results.

Wilts, Diebacks etc.

1742. WELLS, D. **Control work on Dutch Elm disease.** *Amer. Nurserym.* 102 (8), 1955 (15, 82 . . . 85).

Reviews the progress made in the U.S.A. in chemotherapeutic methods of controlling the disease, the substances tested (Na salicylate, $KMnO_4$, alkaline substances to raise sap pH, Na 4,5-dimethyl-2-thiazolyl-mercaptoacetate), and methods of application (spiral bore holes, foliage spray, soil injection).

1743. KERLING, L. C. P. **Reactions of Elm wood to attacks of *Ophiostoma ulmi* (Buism.) Nannf.** *Acta bot. neerland.* 4 (3), 1955 (398–403). 11 refs. [E.e.] O.B.D.

Discoloration of the walls of the vessels and formation of gum droplets in the pit cavities were followed by the development of tyloses. The expanding living cells always pierced through those pits where gummosis was absent. These reactions are caused by the toxin produced by the spores. At places where many spores adhere to the walls of the vessels, gummosis may occur. At other places, where the toxin is less concentrated, tyloses may appear. *From author's summary.*

1744. WHITE, I. G. **Toxin production by the Oak wilt fungus *Endoconidiophora fagacearum*.** *Amer. J. Bot.* 42 (8), 1955 (759–64). 13 refs. O.B.D.

[Cf. *For. Abstr.* 16 (Nos. 646, 3141).] When grown on a completely synthetic medium containing glucose and asparagine, *Chalara quercina* produces in the culture medium a toxic metabolic product that induces wilting and necrosis in leaves of *Quercus lyrata*. Differences in toxin-producing ability were found among the 3 strains studied. Toxin production is evident earlier and higher titres are produced in shake cultures than in stationary cultures. Greater mycelial growth, more rapid glucose utilization, and greater change in pH also characterized shake cultures. The toxin is non-volatile and thermo-stable, is unaffected by pH within the range of 2·5–9·0, and can be removed from the culture filtrate by adsorption on charcoal. Fractionation of culture filtrates with ethanol showed that 2 toxic components are present. One is alcohol-insoluble, non-dialysable and produces drying and wilting of the leaves; there is evidence that it is a polysaccharide. The second, which appears to be the principal toxin, is soluble in alcohol and insoluble in ether, and is responsible for the necrosis part of the symptom complex. *From author's summary.*

1745. FERGUS, C. L., and COLE, H., JR. **Longevity of Oak wilt fungus stored under mineral oil.** *Phytopathology* 45 (7), 1955 (405). 5 refs.

Endoconidiophora fagacearum stored for 3 years under mineral oil suffered little or no alteration in its morphological, sexual and pathogenic characteristics [cf. *For. Abstr.* 13 (No. 4330)]. The tests included inoculation of Red Oak seedlings and recovery of the isolates.

1746. CAMPBELL, R. N., and FRENCH, D. W. **A study of mycelial mats of Oak wilt.** *Phytopathology* 45 (9), 1955 (485–9). 18 refs.

Covers the seasonal pattern of mat production (first discovered in 1951), and its duration in individual trees (*Quercus ellipsoidalis* and *Q. macrocarpa*), and occurrences near openings in bark and the effect of temperature on the formation of perithecia. [Cf. *For. Abstr.* 15 (Nos. 1517 and 1520).]

1747. HIMELICK, E. B., and CURL, E. A. **Experimental transmission of the Oak wilt fungus by**

caged squirrels. *Phytopathology* 45 (11), 1955 (581–4). 6 refs.

The % of potted Oaks developing wilt after being gnawed by squirrels which had been fed with (*a*) conidia, (*b*) ascospores + conidia and (*c*) fresh conidium-bearing mats, was respectively 33, 37 and 33. (*a*) and (*b*) were laboratory inoculum given on ripe apple, and with this, transmission occurred up to 12 hours after eating; with (*c*) transmission was effective up to one hour. These animals are judged from this and from field observations to be occasional agents of transmission in the field. Of several repellents tried, only creosote deterred squirrels from feeding on the subcortical fungus mats.

1748. SOMMER, N. F. **Sunburn predisposes Walnut trees to branch wilt.** *Phytopathology* 45 (11), 1955 (607–13). 8 refs.

[Cf. *For. Abstr.* 11 (No. 677).] *Hendersonula toruloidea* inoculations failed or were only weakly parasitic to normal branches of vigorously growing *Juglans regia*. When branches were even mildly sun-scorched, extensive cankers developed. Severe damage is limited to orchards where high summer temperatures occur and particularly to the south and west side of trees. The high humidities required for spore germination are evidently provided by the host tissues. Whitewashing of branches exposed to the sun effectively reduced the take of inoculations, evidently because this reduced the amount and severity of sun-scorch and thus the opportunity for infection. These conclusions are supported in detail by laboratory tests (temperature and humidity requirements), climatic data and practical field experiments.

Cankers, Stem Rusts etc.

See also Nos. 1237, 1454.

1749. ROTH, C. Die Wachstumsgeschwindigkeit von Weisstannenkröpfen. **[The rate of growth of *Melampsorella caryophyllacearum*.]** *Schweiz. Z. Forstw.* 106 (11), 1955 (657–65). 1 ref. [G.]

Measurements of the growth of this fungus (a bark parasite of *Abies alba*) were made over a period of several years, and the data are given in full and analysed statistically. No correlation was found between stem increment and the rate of growth of the fungus; but a relation was found to exist between rate of growth of the fungus and its extent, ranging from ca. 0·5% for a canker measuring 20–40% of stem girth to 1·9% for a canker measuring 80–100% of stem girth. Rate of growth appeared to diminish with height above ground.

1750. WATERMAN, A. M. **A stain technique for diagnosing blister rust in cankers on White Pine.** *For. Sci.* 1 (3), 1955 (219–21). 6 refs.

Describes a technique using a revised formula [given] of Pianeze IIIb stain and gives the diagnostic characters of the fungus thus revealed.

1751. MÜLDER, D. Die Disposition der Kiefer für den Kienzopfbefall als Kernproblem waldbautechnischer Abwehr. **[The susceptibility of Pine to *Peridermium pini* infection as a central problem of silvicultural control.]** *Schr Reihe forstl. Fak. Univ. Göttingen* No. 10, 1955. pp. 35 + 7 charts. 19 refs. [G.g.]

Foci of infection were counted and dated (by assuming original infection of a 3-year-old shoot) on 12 trial plots of ca. 0·25 ha. at Ahlhorn (Oldenburg) and Dannelburg (Elbe) on 7- to 60-year *Pinus sylvestris* stands. Susceptibility as measured by age of first infection and degree of re-infection varied considerably between individuals. Analysis of incidence within the stands showed no significant influence of diseased neighbours, or of neighbouring stands. Susceptibility rose from almost nil for trees < 20 years old to a maximum at ca. 40–50, declining thereafter. It appeared to be associated with vigour, the upper height classes in the thicket stage and the higher diameter classes in a 33-year stand suffering most. At the provenance-trial plots at Trippstadt, Belgian and Palatinate provenances were worst hit, Hungarian ones not at all. Control by silvicultural measures must vary from stand to stand, but the cutting out of infected trees is not likely to halt the spread of infection.

1752. HATTORI, S., MATSUDA, H., SHIROYA, T., and NAKAHARA, K. Über den aus Stammblasen von *Pinus thunbergii* ausgeschiedenen Honig. **['Honey' from stem galls of *P. thunbergii*.]** *Zeitschrift für Botanik, Stuttgart* 43 (2), 1955 (125–37). 15 refs. [G.] O.B.D.

A chemical analysis of the honey-like exudation from galls caused by *Cronartium quercuum*.

1753. CAROSELLI, N. E. **Bleeding canker disease of hardwoods.** *Sci. Tree Top.* 2 (1), 1953 (1–6).

Phytophthora cactorum has been isolated from several hosts not hitherto known to be affected by this fungus (6 *Acer* spp., 2 *Betula* spp., *Tilia americana*, *Aesculus hippocastanum*, *Liquidambar styraciflua*, and *Salix babylonica*). Symptoms are described and methods of chemical control indicated.

1754. GRAVATT, G. F. **Effect of Chestnut blight on the tannin extract industry [in the U.S.A.].** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955*, No. *FAO/CH*/16-*A*, 1955. pp. 2. Limited distribution.

1755. GYÖRFI, J. A nyárkéreghalál és a nyárfarák magyarországi károsítása. **[Damage to Poplars from bark decay and canker in Hungary.]** *Erdész. Kutatás., Budapest* No. 3, 1954 (105–14 + smries in suppl.) 19 refs. [Hu.e.g.]

The author describes and illustrates two forms of bark decay. One, which he ascribes to *Dothichiza populea*, seems to be especially dangerous in the dormant season and chiefly to attack × *P. marilandica*, × *P. robusta*, *P. simonii*, *P. nigra* and *P. n.* var. *italica*, in the region between the Danube and Tisza. The other, also favouring that region, and characterized by brown staining that later turns black with pycnidia, attacks chiefly × *P. robusta*, *P. n.* var. *italica*, and × *P. marilandica*. The pathogen is probably *Cystospora chrysosperma*. Various forms of canker are also described and discussed: *Pseudomonas syringae* f. sp. *populae* on × *P. robusta*, × *P. regenerata*, × *P. serotina*, × *P. berolinensis*, *P. trichocarpa* and × *P. eugenei*; *Nectria galligena*; and *Valsa sordida*.

Foliage Diseases

1756. GROVES, J. W., and BOWERMAN, C. A. **The species of *Ciborinia* on *Populus*.** *Canad. J. Bot.* 33 (6), 1955 (577–90 + 1 plate). 10 refs. O.R.S.

Concludes that the correct name for the eastern species causing ink-spot disease of Poplar is *C. whetzelii* and proposes *C. seaveri* nom. nov. for the western species. Describes *C. pseudobifrons* sp. nov. and *C. davidsoniana* sp. nov.

1757. BARR, M. E. **Species of sooty moulds from Western North America.** *Canad. J. Bot.* 33 (5), 1955 (497–514). 31 refs. O.R.S.

Describes *Limacinia* and *Capnodium* spp. found on conifers and *Alnus* sp.

1758. KANDASWAMY, M., and SUNDARAM, N. V. ***Septoria* leaf spot of *Manilkara hexandra*.** *Curr. Sci.* 24 (6), 1955 (210). A.P.B.

Describes *S. hexandrae*, a new species infecting living leaves of *M. hexandra*.

Fungus Diseases: Miscellaneous

1759. CARTER, J. C. **Treatment of the wetwood disease [of Elm].** *Amer. Nurserym.* 102 (9), 1955 (11–2, 86–7).

Notes on the symptoms, diagnosis, and treatment (for ornamental trees) of this bacterial disease.

444. Virus Diseases

1760. FISCHER, R. Über das Auftreten von Virussymptomen an Holzgewächsen nach dem Rückschnitt. **[The occurrence of virus symptoms in woody plants after cutting back.]** *PflSchBer.* 15 (5/6), 1955 (65–77). 20 refs. [G.g.e.] C.G.B.

Cites some examples from literature and cases of ring-spots in Lilac and *Sambucus nigra* in Austria, where symptoms of virus disease appear to be connected with cutting back in winter. The intensity of the disease appears to be related to the vigour of the regrowth, and it is suggested that the disease is in some way connected with increased N metabolism. *From author's summary.*

45. Damage by Animals

451. Mammals

See also Nos. 1422, 1621, 1695.

1761. **[Damage to *Pinus halepensis* var. *brutia* by sheep.]** *Rep. For. Dep. Cyprus 1954*, 1955 (67).

Tests on the palatability of seedlings of *P. halepensis* var. *brutia* to sheep show that they are apparently unpalatable. The definite reduction in seedlings on grazed areas is presumably a result of the physical effect of being trodden on by the flock, which is let in once a quarter.

1762. STOECKELER, J. H. **Deer, mice and hares damage young Aspen and Paper Birch plantings in northeastern Wisconsin.** *Tech. Note Lake St. For. Exp. Sta.* No. 441, 1955. pp. 1.

Most of the loss in the first 3 years was due to girdling by *Microtus pennsylvanicus*.

1763. **Traps for grey squirrels.** H.M. Forestry Commission, London. Revised 1955. pp. 10.

1764. HOLMES, G. D. **Experiments with chemical repellents for protecting trees against rabbits.** *Rep. For. Res. For. Comm., Lond. 1953/54*, 1955 (148–58). 10 refs.

The repellent compounds examined during 1953 and 1954 were applied only to newly planted deciduous hardwood species in the winter. Some caused serious injury to the trees, particularly where applied over all aerial shoots of the plants, as in the case of Oak and Beech. Basal treatment of large plants was generally less injurious, indicating that any practical use of these preparations is likely to be with this method. Applications to evergreen conifers have not been critically tested, but small trials on Scots Pine transplants indicate that some compounds, notably bone oil, are injurious, while resin, rubber emulsion and starch paste appear harmless. The results of 1953–54 trials on hardwoods under forest conditions show a number of inconsistencies in the results obtained with several compounds. However, the main conclusions from these preliminary investigations may be summarized as follows: (1) No chemical repellent remained effective in protecting young plants against damage by rabbits for longer than 6 months after application. The most recent trials show promising results with cycloheximide [actidione] and Herbasan for 6 months after treatment. Both of these compounds, however, were directly injurious to young trees, causing many deaths, and further work is required to examine alternative methods of application. (2) Bone oil and resin/alcohol have given inconsistent and disappointing results. The latter was repellent for a time, but was weathered off the plants very rapidly and warrants further trials with an efficient adhesive. (3) Zn dimethyldithiocarbamate-cyclohexylamine, was almost completely ineffective as a repellent when applied in starch paste or rubber-latex emulsion, and should be tried with other adhesives. Rubber-latex emulsion (Revertex), which was used as an adhesive, was shown to be harmless to the trees and to have some repellent properties when applied alone. (4) The proprietary repellents Herbasan and C.G.A. Tree Bark Protector gave protection for 6 months in 1954, but both were injurious to trees, except when applied only as basal treatments to larger trees. Sinoxyd-F was almost completely ineffective for protection of young Oak and Ash plants. (5) The area selected for these experiments supports an exceptionally high rabbit population and provided a most rigorous test of all compounds. The incidence and severity of rabbit damage to planted trees was found to vary considerably according to the type of ground vegetation into which the trees were planted. Least injury occurred to trees planted in uncut bracken, and under these conditions quite a high degree of protection was given even by the less generally effective treatments such as resin and Revertex. This point is of some importance as it indicates that failure of a compound on exposure to the extremely heavy rabbit grazing occurring over most of the experiment, does not necessarily mean that

the compound will fail under other conditions. In areas less exposed to grazing, or in localities with a lower rabbit population it is possible that the compound may provide protection for a time. *From author's summary.*

1765. BERR, A. Bericht über die Anwendung und Wirkung des Wildverbiss- und Schälschutzmittels RVS. **[The use and effectiveness of RVS in preventing deer damage.]** *Anz. Schädlingsk.* 28 (11), 1955 (166–8). [G.]

Tests were made with Regensburger Verbiss- und Schälschutzmittel (RVS), a sticky paint made by Michael Barthel & Co., Regensburg, and repelling by its texture rather than by its odour or chemical properties. The paint was applied in December 1954 and still remained effective in June 1955.

1766. SZEDERJEI, Á., and VIDRA, J. A szarvas hántásának élettani oka és az ellene való védekezés. **[The biological causes of bark-scaling by deer, and its control.]** *Erdész. Kutatás., Budapest* No. 4, 1954 (91–106 + smries. in suppl.). [Hu.e.g.russ.]

Reviews the possible reasons for barking, which assumes serious proportions in Hungary, and investigates them in detail for red deer. It is shown that the deer will commonly bark trees even when alternative and highly palatable food exists in abundance, so that artificial feeding at certain seasons does not provide a remedy. Various methods of prevention, and trials with repellents are enumerated and described. The best repellent proved to be a mixture of vaseline, oil [paraffin], and either pyridone or cresol in bentonite, though it somewhat affected the trees. Blood albumen was also good but lacked adherence. Various home-made mixtures (e.g. clay, liquid manure, animal dung, lime, tar) proved poor repellents.

452. Birds

See No. 1193.

453. Insects

See also No. 1482.

1767. GRAHAM, K., and STARK, R. W. **Insect population sampling.** *Proceedings of the Entomological Society of British Columbia, Victoria* 51, 1954 (15–20). 8 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 143.) L.S.

After a theoretical introduction the second author exemplifies methods and techniques for 3 forest defoliators, the European Spruce sawfly, the Lodgepole needle-miner, and the Spruce budworm. [Cf. *For. Abstr.* 15 (Nos. 3798, 3000).]

1768. MORRIS, R. F. **The development of sampling techniques for forest insect defoliators, with particular reference to the Spruce budworm.** *Canad. J. Zool.* 33 (4), 1955 (226–94 + 3 plates). 36 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 209.) O.R.S.

The nature of the problems and the methods of solution should apply to other insects, but the solutions themselves will apply only to Spruce budworm. The work was initiated in 1945 in the Green River watershed and has so far been confined to the preferred host, *Abies balsamea.* Problems discussed are: the expression of population, objects, timing and mechanics of sampling, selection of the universe, and of the sample unit, representativeness in the tree and the stand, correlation between successive samples, transformation of data, optimum sample size, absolute population and incidental data (population intensity, life-table data, and other sampling systems). [Cf. *For. Abstr.* 16 (Nos. 1976–7).]

1769. ROSS, D. A., and EVANS, D. **Annotated list of forest insects of British Columbia. Part I—Lasiocampidae, Saturniidae, Liparidae. Part II—*Laspeyresia* spp. (Olethreutidae).** *Proceedings of the Entomological Society of British Columbia, Victoria* 51, 1954 (40–4). 3 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 134.) L.S.

The first and second of a series of annotated lists of insects collected or reared by the Forest Insect Survey since 1937. Collection localities are given in broad categories except where there are fewer than 5 scattered places of collection. Brief descriptions of the larvae are included where they are known. The two parts mention 20 species.

1770. OSSOWSKI, L. L. J. **Notes on insects observed [damaging Wattles] during the period 1954–1955.** *Rep. Wattle Res. Inst. S. Afr. 1954/55,* 1955 (26–8).

Very heavy summer rainfall reduced the populations of nearly all the important Wattle insects. Notes are given covering the year. [Cf. *For. Abstr.* 16 (No. 3169).]

1771. BYTINSKI-SALZ, H., and NEUMARK, S. **[Plant protection problems in forestry and afforestation.]** *La-Yaaran* 5 (3/4), 1955 (20–3, 29). 8 refs. [Heb.e.]

Lists the main insect pests of Pine, Eucalypts, Tamarisk, Acacias, and Poplars in Palestine. Control measures, except to maintain the very existence of plantations, are excluded as costing more than the value of a single year's increment.

1772. **Insects attacking *Eucalyptus* species [in Cyprus].** *Rep. For. Dep. Cyprus 1954,* 1955 (65).

So far, only two insects have been found: a cerambycid bred from *Eucalyptus* logs lying at Athalassa and a large carabid beetle found on the roots of young plants. No economic importance is attached to either of these insects at present.

1773. HAY, C. J., and WOOTTEN, J. F. **Insect damage in hardwood sawlogs.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 148, 1955. pp. 14.

Of 219 logs (82% Oak) sampled at 19 sawmills in S.E. Kentucky, 88% of the Oak logs and 53% of logs of other hardwoods were damaged by insects; 73% of Oak boards showed damage. Degree of infestation and amount of damage tend to increase with increasing tree size. Investigation was confined to damage by insects actually entering the wood of living trees.

Insects: Natural and Biological Control

See also Nos. 1194, 1786, 1789, 1792, 1797, 1800, 1817–8.

1774. RICHARDS, O. W. **On the Bethyloidea (Hymen.) of Israel.** *Bull. Res. Coun. Israel* 4 (4), 1955 (357–9). 4 refs. A.P.B.

Localities and some hosts are indicated for 26 species, chiefly parasitic on coleopterous, but some on lepidopterous larvae. Much could be done by deliberate breeding of parasites on these hosts (especially wood-boring larvae). *Sclerodermus domesticus*, taken from Cypress timber, is a well known parasite of Anobiidae.

1775. JAHN, E. Betrachtungen zur Natur der Viren. **[On the nature of viruses.]** *Mitt. forstl. VersAnst., Mariabrunn* No. 49, 1953 (46–58). 20 refs. [G.g.]

A theoretical paper, based in part on (published) observations on forest insect viruses, to which nearly half the references relate.

Insects: Physical Control (General)

See No. 1473.

Insects: Chemical Control (General)

See also Nos. 1167, 1472, 1785, 1808.

1776. STEFANOV, D. Uništožavane na korenogriževите nasekomni vrediteli v polezaštitnite gorski pojasi črez častično izpolzuvane na heksahloran (12%). **[Control of root-feeding insect pests in field shelterbelts [in Bulgaria] by the partial application of BHC (12%).]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (159–71). 10 refs. [Bulg.russ.]

The following root-feeders were found in shelterbelts in 1952–53: *Rhizotrogus aequinoctialis, Pentodon idiota, Agrotis temera, Pedinus femoralis, Agriotes sputator, Blaps halophila, Melanotus brunipes, Opatrum sabulosum* and others. To test the effectiveness of BHC: (1) acorns of *Quercus pedunculata, Q. conferta* and *Q. rubra* were dusted, before sowing, with 60–100 g. of 12% BHC per kg. of acorns, and (2) the soil round young plants in the shelterbelts was dusted before the first or second weeding and soil loosening, at 35–40 g. BHC/sq. m. Both methods proved effective. (1) should be done in the autumn, using 80–90 g./kg. (in some cases this killed the embryo of *Q. pedunculata*) and (2) when the first seedling damage is noticeable or when certain critical densities of the larval population (given) are exceeded. After dusting, the BHC should be mixed into the soil to a depth of 15 cm.

1777. SIDDIQI, A. A. **Systemic insecticides.** *Pakistan J. For.* 5 (2), 1955 (109–17). 41 refs.

A review of literature.

1778. POTTS, S. F. **New knapsack mist blower.** *Trees Mag., Ohio* 15 (6), 1955 (7, 17).

Describes a sprayer designed by the author and now manufactured commercially, with total weight 60 lb. and able to spray the tops of 30-ft. trees.

Thysanoptera

1779. ANANTHAKRISHNAN, T. N. **The bionomics of the *Mimusops* gall thrips, *Arrhenothrips ramakrishnae* Hood.** *Agra University Journal of Research (Science), Agra* 3 (2), 1954 (463–73). 7 refs. H.S.B.

1780. SINREICH, A. Zum Auftreten des Lärchenblasenfusses (*Taeniothrips laricivorus* Krat.) in Österreich. **[The occurrence of *T. laricivorus* in Austria.]** *Zbl. ges. Forstw.* 73 (3), 1954 (156–64). 4 refs. [G.]

Traces the history and describes the bionomics of this pest, the nature, symptoms and effects (on height growth only) of attack, and lists the attacks recorded in Austria during summer, 1954. Infestations, mostly slight to moderate, are reported from 14 places in Lower Austria, 1 in Styria, and 2 in Vorarlberg, on stands aged 5–30 years at altitudes of 350 to 1150 m. Attacks on mixed Spruce/Larch stands and plantations are reported from the Tyrol and Lower Austria.

1781. SINREICH, A. Schäden des Lärchenblasenfusses in Österreich. **[*Taeniothrips laricivorus* damage in Austria.]** *Öst. Vjschr. Forstw.* 96 (2), 1955 (101–2). 4 refs. [G.]

Cf. preceding abstract.

Hemiptera

See also Nos. 1184, 1801, 2208.

1782. WERTHEIM, G. **New observations on gall-producing aphids on *Pistacia atlantica* in Israel.** *Bull. Res. Coun. Israel* 4 (4), 1955 (392–4). 8 refs. A.P.B.

Lists 5 species galling flowers or leaves.

1783. YUKAWA, Y. **Histo-chemical studies on plant gall tissues. I. Microchemical observation[s] on the insect gall of *Distylium racemosum*.** *Bulletin of the Faculty of Agriculture, Yamaguti University, Simonoseki* No. 4, 1953 (51–6). 1 ref. [E.e.] H.S.B.

Mature galls induced by *Astegopteryx distychii* were examined histologically and chemically. Comparison between gall tissue and leaf tissue was difficult, but the former had a slightly higher pH and greater content of N, P, K, Ca and Mg.

1784. SCHIMITSCHEK, E. Ursachen von Massenvermehrungen der Tannentrieblaus *Dreyfusia nüsslini* C. B. **[Causes of *D. nüsslini* [*Adelges nordmannianae*] epidemics.]** *Wetter und Leben, Wien* 4 (Spec. No. 1), 1952 (48–54). 6 refs. [G.] L.S.

The author traces recent and earlier outbreaks in various parts of Austria (most of which occurred outside the climatic optimum for Silver Fir) and analyses the weather at the bionomically important periods, i.e. chiefly April and May, in the years preceding them. He concludes that unusually dry and warm weather at these times, and not mean annual precipitation, is the decisive factor. Silvicultural measures to influence the microclimate, such as prolonged shade for Fir regeneration, are suggested for prevention.

1785. DUDA, E. J. **The use of systemics to control the scale, *Matsucoccus* sp., on Red Pine [*Pinus resinosa*].** *Sci. Tree Top.* 2 (2), 1955 (20, 22).

[Bartlett Tree Research Laboratories, Stamford, Conn.]

Experiments were made in the injection of systemic insecticides (Systox 25%, Isolan 25%, Pyrazoxan 22½%, 12008 and 12009 (American Cynamid), and OS-1836 E.C.XP-98) into *Pinus resinosa* trees infested with a *Matsucoccus* scale. One pint of solution was used for every 4 in. of g.b.h., giving 0·2–0·25% active ingredient per tree. Treatments were carried out in early May. All solutions were taken up readily by the trees, but at different rates, Systox being taken up much faster than all the others and translocated throughout the tree. There is no evidence that the other substances were so translocated. Further research is in progress.

1786. GRIOT, M. Observaciones sobre algunos parásitos de *Ceroplastes grandis* Hempel. **[Some parasites of *C. grandis*.]** *Repr.* from *Rev. Fac. Agron. Vet., B. Aires* 13 (3), 1954 (491–504). 18 refs. [Span.span.e.] [Universidad de Buenos Aires, Facultad de Agronomia y Veterinaria.]

1787. CANTELO, W. M. **A new scale insect attacking Pine.** *Sci. Tree Top.* 2 (1), 1953 (9–10).

A scale found on *Pinus nigra* var. *austriaca* in Maryland has been identified as *Polyaspis pini*.

Lepidoptera

See also Nos. 1185, 1767–9, 1774, 1776.

1788. BUCKWELL, P. Quelques chenilles et papillons nouveaux de la région d'Ifrane. **[New larvae and adult Lepidoptera from the Ifrane region [Morocco].]** *Bulletin de la Société des Sciences Naturelles et Physiques du Maroc, Rabat* 34 (4), 1954 (351–6). [F.]

Descriptive and biological notes on *Xylomania pungeleri* and *Dendrolimus pini* subsp. *atlantica* found on Cedar, and a *Phigalia* species (*P. buckwellii*?] found on Ash.

1789. MILLER, W. E. **Biology of *Anacampsis innocuella* (Zeller), a leaf-roller on Aspen.** *J. econ. Ent.* 48 (5), 1955 (622–3). 5 refs. [Ohio Agricultural Experiment Station.]

Gives details of this leaf-eater's life history as observed on *Populus grandidentata*, other hosts already reported being *P. wislizeni*, *P. tremuloides*, and *P. alba*. A list of certain, probable, and possible parasites is included.

1790. KURIR, A. Einige Untersuchungsergebnisse aus der Gradation des Fichtennestwicklers (*Epiblema tedella* Cl.) in Österreich 1948–1950. **[Some results of investigations into the *E. tedella* epidemic in Austria, 1948–50.]** *Zbl. ges. Forst- u. Holzw.* 72 (2/3), 1954 (121–47). 33 refs. [G.g.]

Describes all stages of the insect and its bionomics, the nature and extent of the damage, and the distribution and duration of the outbreaks. These occurred in 26 areas covering over 40,000 ha., mainly in the south-eastern Alps, (Lower Austria, Styria and Carinthia) and in the Waldviertel north of the Danube, both in pure and in mixed stands. All infestations observed were on *Picea abies*. Females always laid their eggs on hitherto uninfested trees. In some places the older age classes suffered more, in others, the younger, but none were immune. The insect was found on all aspects and altitudes between 640 and 1700 m. but appeared to prefer S., SW. and SE. exposures. Epidemics lasted from 1 to 3 years, and as soon as they subsided, the attacked trees began to recover.

1791. HARRINGTON, T. A. **Tip moth and webworm in East Texas.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 96, 1955 (2).

In a 1954 test near Nacogdoches, Loblolly seedlings were planted in plots where hardwoods had either been cut, cut and poisoned, or poisoned only. Incidence of *Tetralopha robustella* was 18% on the latter, partially shaded, plots against 4% on the others. Incidence of *Rhyacionia frustrana* was not significantly affected. Neither insect appeared to influence seedling mortality.

1792. THOMSON, H. M. **Microsporidian disease of Spruce budworm.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (2).

Budworms reared from parent stock collected in Ontario County were heavily infected (70–95%) with a microsporidian, *Perezia fumiferanae*.

1793. BODENSTEIN, G. Lärchenschäden durch einen Kleinschmetterling. **[Damage to Larch by a species of the Microlepidoptera.]** *Anz. Schädlingsk.* 28 (11), 1955 (169–71). 11 refs. [G.]

Records an instance of damage to needles of European Larch by larvae of *Cacoecia costana*. This is the first record of this species as a forest pest.

1794. FROELICH, R., HODSON, A. C., SCHNEIDER, A. E., and DUNCAN, D. P. **Influence of Aspen defoliation by the forest tent caterpillar in Minnesota on the radial growth of associated Balsam Fir.** *Minn. For. Note* No. 45, 1955. pp. 2. 2 refs.

A study was made in mixed Aspen/Balsam Fir stands to determine the effect of defoliation of Aspen by *Malacosoma disstria* on radial growth of both species. It was found that during years of heavy defoliation, average radial growth of Aspen decreased by nearly 70%, while that of Balsam Fir increased by 20%.

1795. DUDA, E. J. **The Pine looper on Cape Cod.** *Sci. Tree Top.* 2 (2), 1955 (15).

Experiments showed that *Lambdina* (*Ellopia*) *athasaria*, which has reached epidemic proportions on *Pinus rigida* on Cape Cod, can be controlled by spraying, using 6% DDT solution in a mist blower or 2 lb. wettable 50% DDT/100 gal. water in a hydraulic sprayer.

1796. POSTNER, M. Beschädigung von Jungfichten und Jungbuchen durch Raupen des grossen Gabelschwanzes, *Dicranura vinula* L. (Notodontidae, Lepidopt.). **[Damage to young Spruce and Beech by larvae of *D. vinula*.]** *Anz. Schädlingsk.* 28 (11), 1955 (168–9). [G.]

Instances are cited of severe damage to young Spruce and Beech by larvae of *D. vinula*, which prepare a suitable place for pupation by making a shallow hollow in the bark and surface wood, using

the débris to form a cocoon [cf. *For. Abstr.* 13 (No. 2756)]. In mature trees injury so caused may be negligible; in young trees it can be fatal.

1797. JERMY, T. Über einige Raupenfliegen der *Hyphantria cunea* Drury. **[On some tachinids parasitic on *H. cunea* larvae.]** *Acta Agronomica Academiae Scientiarum Hungaricae, Budapest* 3 (1/2), 1955 (25–34). 5 refs. [G.g.e.russ.] A.P.B.

The following local tachinids were found on larvae of *H. cunea*, recently imported into Hungary from America: *Tachina larvarum, T. fallax, Pales pavida* and *Compsilura concinnata*. The degree of infestation varied from nil to 62%. In experiments with *T. larvarum* bred in the laboratory, 76% of the infested larvae died, but as only some 20% of a total of about 50 eggs laid by one ♀ *T. larvarum* developed into imagos, this insect would not be suitable for biological control. The reproduction rate of *T. fallax*, bred on *Galleria mellonella* as laboratory host, proved even less satisfactory.

1798. VAZ, A. L. CASTELÃO. A luta contra a *Lymantria dispar* L. em Portugal. **[Control of *L. dispar* in Portugal.]** *Bol. Junta nac. Cortiça, Lisboa* 17 (202), 1955 (278–84, lxxi, 61). 12 refs. [Port.e.f.]

Summarizes work achieved from 1945 to 1948 by the Commission for Control of *Lymantria* and from 1949 onwards by the Forest Service, both by mechanical and chemical methods.

1799. LAUSCHER, F. Die Rolle mikroklimatischer Faktoren beim Massenauftreten von Waldschädlingen. **[The influence of microclimatic factors in forest insect outbreaks.]** *Wetter und Leben, Wien* 5 (11/12), 1953 (195–200). 3 refs. [G.] L.S.

To test his theory that the outbreak of *Lymantria monacha* in Austria in 1946 was due to differential temperature trends on tree boles and in forest soil, favouring the development of the moth *vis-à-vis* its predators and parasites, the author analysed air, soil and bole temperatures recorded for 1937 at the meteorological station Lunz-am-See, about 20 km. to the north of the main outbreak area. He found that a sequence of clear days significantly increased the temperature differences between forest soil and tree boles (particularly those along western margins) and that the weather in April 1946 must have resulted in this difference reaching a maximum for the period 1930–50. He therefore considers his theory corroborated.

1800. VAGO, C., and VASILJEVIC, L. Une virose à localisation intestinale avec affinité cytoplasmique chez le lépidoptère *Thaumatopoea processionea*. **[A virus disease located in the intestine of *T. processionea*, with cytoplasmic affinities.]** *Antonie van Leeuwenhoek, Amsterdam* 21 (2), 1955 (210–4). 5 refs. [F.g.] O.R.S.

Discusses the differences between this and the normal polyhedral viruses found in *T. processionea*. [Cf. *For. Abstr.* 15 (No. 1590).]

1801. RUMMUKAINEN, U. Eräiden kuusenkäpytuholaisten esiintymisestä eri leveysasteilla. **[The occurrence of some insect pests of Spruce cones at different latitudes in Finland.]** *Commun. Inst. for. Fenn.* 42 (4), 1954 (1955). pp. 21. 22 refs. [Fi.g.]

A study was made in 1951 and 1952 of the occurrence and distribution of *Laspeyresia strobilella, Dioryctria abietella, Pegohylemyia anthracina* and *Perrisia strobi*, all found infesting Spruce cones in Finland.

1802. ALLEN, R. M., and COYNE, J. F. **Reducing Longleaf cone losses.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 98, 1955 (2–3).

At the Southern Institute of Forest Genetics, first-year cone losses were reduced from 68% to 26% by spraying with BHC. Most of the damage prevented was that from the cone beetle *Ernobius granulatus*, whereas cone losses due to a pitch moth, possibly *Dioryctria amatella*, were not reduced, presumably because of the lateness of the first sprayings (April).

Coleoptera

See also Nos. 1186–9, 1222, 1436, 1512–3, 1772, 1774, 1776, 1802.

1803. **The Cypress borer (*Buprestis cupressi*).** *Rep. For. Dep. Cyprus 1954*, 1955 (65).

This insect was first noticed in a young plantation of *Cupressus sempervirens* at Athalassa. Damage in stems of standing trees was very great and it is clear that this intensity of attack is directly associated with bad site factors operating over a long period. The borer has since been found to be widely distributed in Cyprus.

1804. PALM, T. Coleoptera in brandskadad skog vid nedre Dalälven. **[Coleoptera in fire-damaged forest in the lower Dalälv region.]** *Entomologisk Tidskrift, Stockholm* 76 (1), 1955 (40–5). [Sw.g.] O.R.S.

Lists some 50 species found on Oak and Pine damaged by fire. The list is essentially the same as one of Coleoptera in N. Sweden. *Melanophila acuminata, Stephanopachys linearis* and some Cerambycidae were among the most harmful insects, preventing salvage of much of the timber.

1805. PRENTICE, R. M. **Pine root-collar weevil in Manitoba.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (1–2).

A weevil tentatively identified as *Hylobius* sp. has been discovered attacking root collars in Pine plantations in Manitoba. Up to 25% mortality occurs in Scots Pine and Lodgepole Pine plantations aged 7–18 years. Damage to Red Pine and Jack Pine is negligible.

1806. MURAYAMA, J. **Scolytid fauna of the Chugoku and Kinki districts.** *Bulletin of the Faculty of Agriculture, Yamaguti University, Simonoseki* No. 4, 1953 (1–38). Many refs. [E.] H.S.B.

Gives a list of 76 species of Scolytidae and 9 of Platypodidae with distribution and host data, and a systematic list of 53 plants in these districts attacked by scolytids; also a description of two new species, *Ips multidentatus* (host *Pinus densiflora*) and *Ernoporus shimanensis* (host *Fagus crenata*) and a new form of *Platypus hamatus* (hosts *F. crenata* and *Quercus crispula*).

1807. STRUBLE, G. R., and HALL, R. C. **The California five-spined engraver [*Ips confusus*]: its biology and control.** *Circ. U.S. Dep. Agric.* No. 964, 1955. pp. 21. 11 refs. [California Forest and Range Experiment Station.]

Ips confusus has long been known in California but was, until recently, considered a secondary barkbeetle species associated with the Western Pine beetle. Unprecedentedly heavy logging between 1943 and 1951, especially in second-growth Ponderosa Pine, resulted in large accumulations of fresh slash, a favoured breeding ground for this beetle, and outbreaks have been killing Pine on a scale previously unknown. Studies on the biology, ecology, and control of the insect have been in progress since 1945, and the following points have been established. Fresh slash is attacked heavily, beginning in April; the resultant broods develop to maturity and the adults emerge to attack and kill trees from midsummer on through the autumn. Average seasonal development, through most of the range of distribution, is 3–4 generations. Outbreaks are fostered by favourable temperatures and relative humidity and possibly by conditions when soil moisture falls below what is required to maintain tree vigour. Natural control factors (parasites, predators, adverse weather) tend to check infestations but do not control them. Suggested control measures are lopping and scattering logging slash, timing felling as late in the season as possible, and the use of toxic oil sprays where practicable.

1808. KINGHORN, J. M. **Chemical control of the mountain Pine beetle and Douglas Fir beetle.** *J. econ. Ent.* 48 (5), 1955 (501–4). 4 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 206.)

Systox, though toxic to *Dendroctonus monticolae* in pilot tests, failed to reduce brood survival when applied to girdles on *Pinus contorta*. Bark sprays of 2 fumigants and 7 residual insecticides were tested on short logs on a pilot scale, and the results on this insect and on *D. pseudotsugae* are reported. In field tests on standing trees, results differed and a pilot test indicates that $C_2H_4Br_2$ (at 2 lb./5 gal. 20% fuel oil) provides an effective spray with a margin for inadequate bark coverage. [Cf. *For. Abstr.* 15 (Nos. 1601, 3826).]

1809. MOGREN, E. W. **A study of some aspects of susceptibility of Ponderosa Pine to attack by Black Hills beetle [*Dendroctonus ponderosae*].** *Abstr. of thesis*, in *Dissert. Abstr.* 15 (9), 1955 (1477). [University of Michigan.] O.R.S.

The two problems studied are the susceptibility of Ponderosa Pine to attack and its resistance to the beetle after attack. Differences in conditions and characteristics of infested and uninfested trees were statistically analysed, and the following conclusions drawn: Differences in susceptibility to attack are related to tree vigour. Vigour requirements for a tree to resist attack vary with the level of beetle population. Beetles leaving the brood tree attack neighbouring susceptible trees. Trees with bark damage in areas of low beetle population are more subject to attack than undamaged trees. Paired trees are preferable to paired plots as sampling units. Differences between susceptible and less susceptible trees were not readily discernible in the field but only as a result of careful sampling. The following conclusions were drawn from an analysis of resistant and non-resistant trees: Some Ponderosa Pines are truly resistant and their resistance is a reflection of good vigour. Resistance can be related to earlier dominance of a tree among a group of trees. Early dominance leads to increasing differences in size and vigour between dominants and non-dominants so that resistant trees are the largest, have the best crown development, and occupy the best position in the forest canopy. Resistant trees appear to have a greater number of resin ducts. The number of resistant trees is relatively small. Only about 5% of trees attacked by the beetle are able to resist successfully.

1810. KEEN, F. P. **The rate of natural falling of beetle-killed Ponderosa Pine snags.** *J. For.* 53 (10), 1955 (720–3). 2 refs.

[Cf. *For. Abstr.* 12 (No. 3357).] Observations on thousands of marked trees show that the rate of fall of beetle-killed trees varies primarily with time elapsed since death. The rule of thumb that the last 10 years' loss can be calculated from the total number of snags is a useful approximation in cruising. Soil conditions, diameter, and other variables modify the rate of falling. On moister loams 15, 40, 60, 80 and 90% had fallen in 4, 6, 8, 12 and 20 years respectively, the rate being slower on drier pumice soil. Larger diameters may stand more than 40 years and economy in snag disposal requires that trees of $\geqslant$ 30 in. diameter (25% of the stems) should be felled first, the smaller diameters falling naturally.

1811. LEE, R. E., and SMITH, R. H. **The black turpentine beetle, its habits and control.** *Occ. Pap. Sth. For. Exp. Sta.* No. 138, 1955. pp. 14. 5 refs.

A short monograph on the beetle which, since 1949, has become a primary tree-killer in the south, particularly in disturbed stands, attacking the bark and also the roots of all Pines and of Red Spruce. Spraying with BHC in fuel oil prevented attacks on stumps and trees, and killed broods beneath the bark, though it did not always save the trees. Attacks by other beetles and fungi after the original infestation make prompt salvage important.

1812. MERKEL, E. P., KULMAN, H. M., *et al.* **Beetle conditions in north-central South Carolina.** *Sth. Lumberm.* 191 (2389), 1955 (60 . . . 62).

Reports on scattered outbreaks estimated at 720 acres in an area of 4000 sq. miles, ca. 40% attributable to *Dendroctonus frontalis* and 60% to Pine engravers. A noteworthy feature was the presence of an unusually high number of cerambycid and secondary barkbeetle broods. The outbreaks have declined rapidly.

1813. APT, Ö. Az 1954. évi czerebogárimágó irtási kísérletek. **[Experiments on the control of cockchafers in 1954.]** *Erdész. Kutatás., Budapest* No. 4, 1954 (71–80 + smries. in suppl.). [Hu.e.g. russ.]

Illustrated description of trials with a Swissatom 200 dusting machine along the margin of a heavily infested broadleaved stand, using BHC (0·32–12·0 g./m.) and DDT (rate not determined). Along the whole 10–11 km. treated, the BHC proved highly lethal, whereas the DDT caused mass chafer flight, vitiating accurate assessment of mortality. It was concluded that γBHC at a rate of 0·5–0·8 g./m. corresponding roughly to 0·012–0·055 g./sq. m. would ensure at least a 95% kill, that emulsions were far more effective than powder, and that all such measures require supplementing by hand collection and disinfection of the soil.

Hymenoptera

See also Nos. 1190–2, 1598, 1767.

1814. BENJAMIN, D. M. **The biology and ecology of the red-headed Pine sawfly [*Neodiprion lecontei*].** *Tech. Bull. U.S. Dep. Agric.* No. 1118, 1955. pp. 57. 34 refs. Price 20 cents.

Summarizes the results of co-operative studies on biology, ecology and control carried out in 1947, 1948 and 1949 by the U.S. Forest Service and the University of Minnesota in Illinois and Michigan.

1815. IVES, W. G. H. **Estimation of egg populations of the Larch sawfly, *Pristiphora erichsonii* (Htg.).** *Canad. J. Zool.* 33 (5), 1955 (370–88). 6 refs. O.R.S.

During 1952 a sampling project was conducted in the Whiteshell Forest Reserve, Manitoba, to determine the feasibility of sampling *Larix laricina* to obtain estimates of the egg population. Additional data on the frequency distribution of the number of Larch sawfly eggs per shoot were collected in 1953 and 1954 from several areas in Manitoba and Saskatchewan. The number of eggs per curled tip varied between plots and between trees on one plot, but no factors contributing to variation could be found. The number of curled tips per branch and the number of branches per crown level varied between tree types. Stratification of the sample increased the efficiency of sampling, reducing the standard error by about 15% and the required sample size by about 30%. The large variation in the estimated number of curled tips per tree indicates that a large sample of trees is required to obtain accurate estimates. As a compromise between accuracy and practicability it is recommended that 6-branch samples be taken from each of at least 15 trees, using stratified sampling with proportional allocation. Simple random sampling, taking 2 branches from the mid-crown of at least 25 trees, is suggested as providing a population index of sufficient accuracy for survey purposes. *From author's summary.*

1816. BECKWITH, L. C. **Larch sawfly conditions in the Lake States in 1954: a reconnaissance survey.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 34, 1955. pp. 8 + 1 map.

Data from an aerial survey with some information on cost and recommendations, and from a limited ground survey. Results from the two methods agreed very well.

1817. BUCKNER, C. H. **Small mammal populations on a changing site.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (2).

Drainage of a Tamarack bog resulted in changes in the population of small mammals, notably in the replacement of *Sorex cinereus* by *S. arctica* as the dominant species. This may have repercussions on the Larch sawfly population, since *S. cinereus* rejects 65% of cocoons parasitized, whereas *S. arctica* does not discriminate between parasitized and unparasitized cocoons.

1818. HEIMPEL, A. M. **Investigations of the mode of action of strains of *Bacillus cereus* Fr. and Fr. pathogenic for the Larch sawfly, *Pristiphora erichsonii* (Htg.).** *Canad. J. Zool.* 33 (4), 1955 (311–26 + 9 photos.) 29 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 211.) O.R.S.

1819. LINDQUIST, O. H. **Leaf-mining sawflies on Birch in Ontario.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (1–2).

Profenusa alumna has been recorded for the first time; methods of distinguishing it from *Fenusa pusilla* are indicated.

Diptera

See Nos. 1514, 1801.

459. Other Animals

See also No. 1493.

1820. FORBES, R. S. **Pine bud mite in the Maritime Provinces.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (1).

Trisetacus pini has been collected in a plantation of *Pinus strobus* at Fredericton, N.B. No earlier record of the presence of this mite in Canada has been found, and this appears also to be the first record of its occurrence on *P. strobus.*

46. Damage to Tree Growth by Man

1821. HESTERBERG, G. A. **Relation of logging injuries to decay and degrade following partial cutting in northern hardwoods.** *Abstr. of thesis*, in *Dissert. Abstr.* 15 (8), 1955 (1285–6). [University of Michigan.] O.R.S.

In a comprehensive field investigation on the development of decay at logging scars on *Acer saccharinum*, standing timber was examined and 252 sawlogs with logging scars were sawn at a sawmill, and log grade, log scale, and the amount of cull caused by decay at logging scars were assessed. Two-thirds of the 263 wounds of the Maples felled and sawn occurred in the butt log; presence of decay was found to be related to the original width of the scar and, in the logs with wounds of known age, amount of decay was related both to scar width and to period of infection before felling. Logging scars caused reduction in log grade, and loss in scale in the higher grades. Dissection of logs with 128 branch stubs showed that broken branches < 4 in. in diam. rarely become infected with decay within 20 years, but that larger stubs result in 5–8 bd. ft. of cull in 10 years. *Corticium vellereum, Daedalea unicolor, Polyporus versicolor, Tricholoma unifactum* and

Ustulina vulgaris were isolated from logging scars. *D. unicolor* produced most of the rot in the neighbourhood of the scars. *C. vellereum* did not decay Maple wood within 22 months in favourable laboratory conditions.

48. Injuries Due to Unknown or Complex Causes

See also Nos. 1238, 1256, 1698–9.

1822. CAMPBELL, W. A., and COPELAND, O. L., JR. **Littleleaf disease of Shortleaf and Loblolly Pines.** *Circ. U.S. Dep. Agric.* No. 940, 1954. pp. 41. 31 refs.

Supersedes *Circ. U.S. Dep. Agric.* No. 716, 1945 [see *For. Abstr.* 7 (No. 977)]. Describes the symptoms of the disease and its spread, summarizes research on its origin, and makes recommendations for the management of affected stands.

1823. COPELAND, O. L., JR. and MCALPINE, R. G. **The interrelations of littleleaf, site index, soil, and ground cover in Piedmont Shortleaf Pine stands [in S. Carolina and Georgia].** *Ecology* 36 (4), 1955 (635–40). 11 refs. [Southeastern Forest Experiment Station, Asheville, N.C.]

A survey was made of 158 stands consisting mainly of second-growth, even-aged *Pinus echinata*. The mean % of trees affected by littleleaf disease was 12·6. The mean site index for the stands was 60·3 ± 0·49 ft. An average of 25% of soil samples yielded isolations of *Phytophthora cinnamomi*; isolation was most successful from moist, heavy-textured soils. Certain deep, well drained soils consistently support stands of high site index and relatively low littleleaf incidence. No relation was found between littleleaf and aspect or topography. Of 13 soil factors analysed by multiple regression, two—internal drainage and erosion—were highly correlated with the incidence of littleleaf. When the ground cover consisted chiefly of broomsedge or grasses, littleleaf was severe and site index and surface soil N generally low; with a diminution in broomsedge and grasses in favour of herbaceous and shrubby plants, littleleaf was lower and site index and soil N higher. Most of the Piedmont forest soils appear to be poor in nutrients. *From authors' summary.*

1824. LEAPHART, C. D., and GILL, L. S. **Lesions associated with pole blight of Western White Pine.** *For. Sci.* 1 (3), 1955 (232–9). 7 refs.

Outlines previous investigations and gives the results of a statistical study of the course of the disease, which confirms inoculation studies in excluding *Leptographium* sp. as a primary pathogen. It suggests that reduced radial growth is always associated with this disease in *Pinus monticola*, and that this precedes both crown decline and lesion development, the latter thus being not directly responsible for the decline. A marked reduction of radial growth in the lower stem usually precedes crown symptoms.

1825. REDMOND, D. R. **Soil temperatures and Yellow Birch decline.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (1).

Previous experiments having shown that an increase of 20° C. in average soil temperature above that naturally occurring during the 1953 growing season increased rootlet mortality in Yellow Birch from 6% to 60% [cf. *For. Abstr.* 16 (No. 740)], an attempt was made in 1954 to produce symptoms of decline in the crown by so regulating the heat applied that the temperature of the soil containing a portion of the root system of an apparently healthy tree would be increased by a small and controlled amount. The tree selected was of 6·6 in. d.b.h., ca. 75 years old, growing in a mixed stand of Balsam Fir, Red Maple and Yellow Birch. Average daily readings of soil temperatures at a depth of ca. 2·5 in., where maximum development of rootlets occurred, was 2·6° higher in the heated area than at the same depth in unheated soil. Examination of rootlets showed that 74·7% of those in the heated portion of the soil were dead compared with 6·2% in the rest of the system. No difference could be observed in the frequency of occurrence of mycorrhizae between those living rootlets remaining in the heated area and those in other sections of the tree. By the end of August the treated tree suffered slight dwarfing, curling, and chlorosis of foliage at the tips of twigs, and by 10 September the 2–3 terminal nodes of many new shoots were bare. The current year's shoots on the treated tree were smaller in diameter than on other trees, but not in length. Only one group of staminate flowers was produced by the treated tree, while each of several neighbouring trees produced several dozen of them.

1826. REDMOND, D. R. **Studies in forest pathology. XV. Rootlets, mycorrhiza, and soil temperatures in relation to Birch dieback.** *Canad. J. Bot.* 33 (6), 1955 (595–627 + 14 photos). 23 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 177.) O.R.S.

Cylindrosporium sp. isolated from dead Yellow Birch roots inhibited the growth of another [unidentified] fungus isolated from mycorrhizal and dead roots. Growth rate of the former increased while that of the latter decreased, with temperatures exceeding the optimum for rootlet development. Twenty-four species of fungi were isolated from mycorrhizae. Seedlings grown aseptically in soil or in agar were inoculated with fungi isolated from dead and dying rootlets and from mycorrhizae, but none of the organisms displayed sufficient virulence to cause Birch dieback. The optimum temperature for development of potted seedlings was about 18·5° C. Increases or decreases of 2° or more from the optimum resulted in increased rootlet mortality, decreased frequency of mycorrhizae, and a thinner mantle of hyphae in mycorrhizae, followed by reduction in foliage vigour. Normal rootlet mortality of 6% in a 55-year-old Yellow Birch stand was increased to 19 and 60% by raising soil temperature 1° and 2° respectively, above the normal during one summer. Soil moisture was not lowered by a statistically significant amount by a 5° increase until the sixth day following rain. Mycorrhizae existed on residual living roots in about the same proportion as on undisturbed root systems. The possibility that Birch dieback may be the result of soil temperature increases is discussed. It is

suggested that cutting practices in hardwood stands should either remove all Yellow Birch trees or prevent increased temperature in soil occupied by residual Birch. [Cf. *For. Abstr.* 16 (No. 740).] *From author's summary.*

1827. STOVER, W. S., and TOOLE, E. R. **Sweetgum blight in Louisiana.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 99, 1955 (3).

About 8% of the cubic volume of *Liquidambar styraciflua* in Louisiana is in infected trees. Top dying appears to be associated with high mortality of feeder roots. Trees with a diameter > 10 in. are more heavily attacked than smaller trees.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

52. Measurements of Stem Dimensions and Volume of Trees, Stands, Forests and Timber

521. Diameter (Girth) and Sectional Area

See also No. 1842.

1828. DANIEL, T. W., and SUTTER, H. **Bitterlich's 'Spiegelrelaskop'—a revolutionary general-use forest instrument.** *J. For.* 53 (11), 1955 (844–6). 1 ref.

Describes the construction of the improved instrument. It measures diameter at any height, estimates basal area with automatic slope correction, establishes distances of 1 and 1·5 chains with a fixed range-finder, measures height, and reads slope on % degree, and topographic scales. The instrument can be fitted with a Hoppus scale. [Cf. *For. Abstr.* 16 (No. 4370).]

522. Height, Length

See also Nos. 1300, 1828, 1872.

1829. STOFFELS, A. **L'exactitude des mesurages à l'aide du dendromètre modifié de Christen. [The accuracy of measurements made with the modified Christen hypsometer.]** *Schweiz. Z. Forstw.* 106 (6/7), 1955 (385–93). 18 refs. [F.g.]

Theoretical considerations and practical experiments lead to the conclusion that Daalder's modification of Christen's method gives slightly more accurate results but that the difference is not of practical importance for trees < 20 m. high, and the additional labour involved makes it of doubtful value even for trees > 20 m. high.

1830. KER, J. W., and SMITH, J. H. G. **Advantages of the parabolic expression of height-diameter relationships.** *For. Chron.* 31 (3), 1955 (236–46). 14 refs.

Six methods of determining parabolic expressions of height/diameter relationships have been compared with two other mathematical methods of curve-fitting. It has been shown that short-cut approximations of the least-squares solution of the parabola are accurate; they are useful because of their ease of application and good conformance with the true height/diameter relationship. In this example the short-cut approximation methods have provided more desirable solutions than those secured using Henricksen's semi-logarithmic method, Stoffel's log-log method, H. A. Meyer's exponential solution of the parabola, and Staebler's precise least-squares solution of the parabolic equation with '*a*' variable. Three short-cut methods for calculating parabolic curves have been illustrated with data from the Campus Forest of the University of British Columbia. Special uses of the parabolic relationship have been described. Construction of site-class volume tables has been demonstrated with data for a number of commercial tree species in the Arrow Lakes District of British Columbia. The short-cut methods of determining parabolic height/diameter relationships have so many advantages that they are recommended for general use in forest inventory and for permanent plot studies. *Authors' summary.*

524. Determination of the Volume of Trees and Stands

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 1451, 1835.

1831. STOEHR, H. A. **Stem taper of Trembling Aspen.** *For. Sci.* 1 (3), 1955 (222–6). 12 refs.

Based on taper measurements and ring counts on 480 felled stems in 60 pure, unmanaged, even-aged plots, the relation in *Populus tremuloides* of the d.b.h. form factor (*f.f.*) to age, *a*; density, *d*; site quality, *s*; and crown class, *c*, is stated in regression equations. The average *f.f.* of stands decreased as *a*, *s*, and *d* increased, the combined effect of these three being highly significant; considered alone, *s*, had the greatest effect; *a* less; and *d*, no significant effect.

1832. KIRBY, C. L. **Construction of a taper table for Jack Pine in Saskatchewan (*Pinus banksiana*—Lamb.).** *For. Chron.* 31 (3), 1955 (218–26). 7 refs.

Based on 938 trees selected over a wide area.

524.3. Volume of Tree Groups and Stands

See also Nos. 1843–4.

1833. BLYTH, A. W. **Standard volume tables for Lodgepole Pine in Alberta.** *Tech. Note For. Br. Can.* No. 9, 1955. pp. 7. 2 refs.

Includes 4 tables: (1) total volume of wood in cu. ft., (2) merchantable volume in cu. ft., (3) bd. ft. volume, Scribner Log Rule, and (4) bd. ft. volume, International ¼-in. Log Rule.

1834. FRAZER, P. W., and BARNES, R. L. **Cubic foot volume table for Turkey Oak (*Quercus laevis* Walt.).** *Res. Note Fla. Sch. For.* No. 2, 1955. pp. 1.

Based on 156 trees from typical *Q. laevis* sites in N. Florida.

1835. ENGSTLER, F. Abweichung und Berichtigung der Einzelstamm- und Bestandesmessung nach dem Verfahren 'Hohenadl' gegenüber der Massenermittlung nach 2-m-Sektionen. **[Deviation and correction of volume data obtained by Hohenadl's method, for single trees and stands, compared with volume determined by 2-m. sections.]** *Mitt. württemb. forstl. VersAnst.* 12 (1), 1955. pp. 43. 18 refs. [G.g.] Price *DM*.3·50.

A statistical study based on a total of 1200 stems (Norway Spruce, Silver Fir, Scots Pine, European and Japanese Larch, and Douglas Fir), from thinnings and clear fellings in Württemberg, volume being calculated from measurement of (*a*) the conventional 2-m. sections and (*b*) the 5 Hohenadl sections, each $\frac{1}{5}$ of total height [cf. *For. Abstr.* 15 (No. 2737)]. For trees > 10 m. high (*a*) always gave a higher volume than (*b*), and for those ca. 30 m. high (so that direct comparison was possible section by section) almost all of the deviation was accounted for in the butt section and is to be attributed to the effect of the root swelling, which is usually missed by the first Hohenadl diameter measurement at $\frac{1}{10}$ of tree height. Regression curves were constructed to test the correlation of the % volume deviations with q (= d.b.h./diam. at $\frac{1}{10}$ tree height), and first-order equations were derived for these curves. Very high correlation coefficients were obtained for all 6 species, and on this basis correction factors were calculated and are tabulated against values of q. Corrected values for (*b*), calculated tree by tree, deviated from (*a*) by $\pm$ 0·5% ($\pm$ 0·2% for > 50 trees). Correction factors deduced by Prodan [cf. *For. Abstr.* 13 (No. 1414)] were also tested. These, which do not distinguish between species, were found to give systematic errors for European Larch and Fir and, to a less extent, for Japanese Larch and Douglas, only Spruce and Pine values being accurate enough for research purposes.

To facilitate comparison of total stem volume with its *Derbholz* (timber $\geqslant$ 7 cm. top diam.) content, tables were prepared giving topwood (< 7 cm.) stem volume % from d.b.h. and height. For trees > 20 cm. d.b.h. or 20 m. high, the table values were satisfactory; for smaller trees they were not accurate enough for research purposes.

The study further showed that mean values could be used both when applying the conversion factors and in calculating *Derbholz* volume, with no loss of accuracy compared with tree-by-tree calculations. Hence, knowing q, mean height, and mean diam., the *Derbholz* volume can be calculated from the Hohenadl stem volume in one operation.

Using Altherr's simplified procedure, no extra measurements are involved for correcting the volumes of the two mean trees (d_- and d_+), and accuracy is much improved.

1836. GÜDE, H. Sind Bestandesmittelstämme echte Repräsentanten für Masse und Zuwachs? **[Are mean stems truly representative as regards volume and increment?]** *Zbl. ges. Forstw.* 74 (2), 1955 (74–84). 5 refs. [G.]

Graphs showing the distribution of the basal area of 4 Spruce stands aged 45, 55, 80 and 115 years respectively, by diameter classes for each of Kraft's tree classes, show considerable overlap, and stems corresponding in diameter to the arithmetic mean b.a. tree are found in classes 1–4 in the younger stands, and in classes 1–3 in the two older ones. Analysis of figures given by Loetsch [cf. *For. Abstr.* 15 (No. 564)] gives similar results for his crown classes. The b.a. - increment history of two 80-year-old trees shows that one, now co-dominant, grew much faster up to ca. 30 years, and much slower thereafter, than its now dominant companion. (Hohenadl's plus and minus trees are also shown to be distributed over different crown and stem classes). It is concluded that the mean stem is not truly representative, particularly as regards increment, unless crown class is taken into account.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also No. 1556.

1837. HORKY, A. Die Waldstandsaufnahme in Österreich. **[The national forest survey in Austria.]** *Schweiz. Z. Forstw.* 106 (6/7), 1955 (373–85). [G.f.]

Describes its objects and the methods to be used.

1838. HAGBERG, E., and TERSMEDEN, C. Rikskogstaxeringen av Östra Mellansverige åren 1950–1952. **[The national forest survey carried out in E. Central Sweden [Örebro, Västmanland, Uppsala, Stockholm, Södermanland, Östergötland and Gotland] in 1950–52.]** *Medd. SkogsforsknInst., Stockh.* 45 (4), 1955. pp. 67. 5 refs. [Sw.e.] Price *Kr*.4.

1839. KELLY, E. B. **The British Columbia forest service inventory plan.** *Pulp Paper Mag. Can.* 56 (12), 1955 (216 . . 222). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1480 (*A* 2*a*).)

A general account covering money allocations and acreage completed, 1945–53; field organization; type mapping from aerial photos and the ground; enumeration procedure; office computation and mapping; accuracy and cost/acre.

1840. DOVERSPIKE, G. E. **Land use and forest survey for Taiwan.** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/55, 1955. pp. 9. 2 refs. [Chinese-American Joint Commission on Rural Reconstruction, Taipei, Taiwan.]

The survey now in progress consists of three main parts: (1) an inventory of forest resources, (2) an inventory of land use by 'problem area classes', and (3) construction of a map showing forest type and volume classes as well as land use and problem areas. Aerial photographs are being used extensively.

1841. ALTRICHTER, W. Das mathematisch-statistische Aufnahmeverfahren (Ergebnisse aus den Beispielflächen). **[Mathematical-statistical inventory methods. (Results from sample areas).]** *Öst. Vjschr. Forstw.* 96 (3), 1955 (204–24). [G.g.]

Reports on work carried out at 7 experimental management areas recently established in various

parts of Austria, covering a great variety of conditions. Four circular sample plots were systematically distributed over each hectare of forest, varying in size from 100 to 400 sq. m. according to circumstances, so as to encompass ca. 15 trees of enumeration size, here ⩾ 16 cm. d.b.h. In addition to d.b.h. and species, an evaluation of bole quality and crown size was recorded. Though permanent sample plots were aimed at, this could not be done by the marking of a centrally situated tree, as such a procedure was found to introduce an element of distortion, e.g. where the systematic centre of the sample plot fell in a gap. On the total area of 786 ha. the volume/ha. calculated by this method was 380 cu.m. against 383 cu.m. obtained by full enumeration. Differences between the volume obtained by both methods never exceeded ± 6% for sub-compartments (average size 5 ha.). Differences in size classes or species were of a similar order. Deviations were greatest on the very steep sites of Hintersee. For increment determination these errors are considered too large and a combination of several areas having similar conditions into aggregates of 100 ha. is suggested. Areas under 2 ha. should always be fully enumerated. The cost of the sample-plot method was just over $\frac{1}{3}$ that of the full enumeration.

1842. GROSENBAUGH, L. R. **Comments on 'Results of an investigation of the variable plot method of cruising'.** *J. For.* 53 (10), 1955 (734). 1 ref.

Disagrees with Husch's precautions against bias [cf. *For. Abstr.* 17 (No. 698)] on the ground that no bias or error arises from counting the same tree from more than one plot centre if the latter are located in an unbiassed fashion. The *D* of his formula should be ignored. To stay at distance *D* from the edge may introduce a definite edge bias. A more valid procedure would be to use the usual random start and, at all points near boundaries, sweep the interior over 180, 120, 90, or 60°, depending on boundary configuration. Each such count would then be multiplied by 2, 3, 4 or 6 respectively. The general conclusions of the article criticized are not affected.

525. Volume by Assortments. Merchantable Volume

See also Nos. 1738–9, 1821, 1835.

1843. YOUNG, H. E. **Empirical volume tables.** *J. For.* 53 (11), 1955 (814–5). 3 refs. [Maine Agricultural Experiment Station, Topeka, Ill.]

Extends Schumacher and Jones' method of log-rule construction [cf. *For. Abstr.* 2 (p. 307)] to the making of a pulpwood volume table for hardwoods in a fifth of the time for conventional methods.

1844. BEDELL, G. H. D., and BERRY, A. B. **A method of determining approximate merchantable volumes.** *Tech. Note For. Br. Can.* No. 14, 1955. pp. 4.

For even-aged stands such volumes are determined from basal area (b.a.)/acre and the height of the tree of mean b.a. A curve was prepared, represented by the equation $V = 0{\cdot}45\ H$, where V = merchantable volume in cu. ft. per sq. ft. of basal area and H = average height in ft.

526. Log Measurement. Scaling

1845. **Pulpwood measurement.** *Res. Note For. Lib. Nthwest. Ont.* No. 1, 1955. pp. 2.

A comparison was made of the accuracy of (1) the scaling stick, (2) the diameter tape, in comparison with water-displacement for measuring pulpwood bolts. Measurements with (1) were made (*a*) to the nearest $\frac{1}{10}$ in., (*b*) to the nearest $\frac{1}{2}$ in., (*c*) to the full $\frac{1}{2}$ in.; those with (2) were either (*d*) at both ends, to the nearest $\frac{1}{100}$ in., or (*e*) at mid-point, to the nearest $\frac{1}{100}$ in. Results (tabulated) showed great variation from the volumes given by water displacement, ranging from + 1·7% for (*c*) to + 16·1% for (*d*). The need for a full-scale investigation is emphasized.

1846. KOMŠILOV, N. F., and SPIRKOVA, L. I. Opredelenie vesa pnevogo osmola. **[Determination of the weight of resinous stumps.]** *Derev. lesohim. Prom.* 2 (12), 1953 [13–5]. 10 refs. [Russ.] From *abstr.* in *Prace Inst. Tech. Drewna* 1 (1), 1954 (71). [Pol.] P.R.

The density of stumpwood is affected by its resin content, moisture content, and site quality. Results of investigations are given in graphs and tables. A formula is given for the dependence of density on the resin content.

527. Solid Volume of Stacked Products

See Nos. 2081–2.

1847. YOUNG, H. E. **Supplement to 'Photogrammetric volume determination of huge pulpwood piles'.** *Photogram. Engng.* 21 (1), 1955 (146). L.S.

Reports on tests carried out by the Great Northern Paper Co. by ground survey and photogrammetric methods, and concludes, that they confirm his view that the latter method is more precise, because the contour lines are more accurately located.

1848. EKLUND, B. Om volymen och antalet bitar per m³t. hos travar av dimensionsblandad och dimensionssorterad 2-meters massaved av gran. **[The volume and number of pieces per cu.m. stacked measure in stacks of 2-m. Spruce pulpwood sorted into sizes or unsorted.]** *Svenska SkogsvFören. Tidskr.* 51 (4), 1953 (303–57). 5 refs. [Sw.sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 28.)

The investigations were made at Munksjö Fabrik AB, Jönköping, on roughly barked material stacked unsorted or sorted into stacks by 2·5-cm. top-diameter classes. The solid volume % (i.e. as a % of the stacked volume) of a stack could be found reasonably accurately from a formula based on the mean mid-diameter of the pieces in the stack and the number of pieces per cu.m. stacked measure (m³t). In sorted and unsorted stacks with the same mean mid-diameter, unsorted stacks reached their highest solid volume at a mean diam. of 16–17 cm., and sorted ones at 13–14 cm., the two curves intersecting at ca. 15 cm. The number of pieces per m³t at different mean diameters can be calculated from the same formula as the solid volume. Solid volumes determined by xylometer measurements were generally rather below those calculated from formulae. Various possible reasons for this are discussed. The loss of volume in 9 of the sorted

stacks during final barking at the mill with a Bezner machine followed by hand barking, was expressed as the barking % (i.e. in % of the roughly barked solid volume before mill barking). This barking % was found to be inversely related to the mean mid-diameter of the pulpwood, the barking % decreasing comparatively steeply with increasing diameter. A formula is given for calculating the solid volume relation between stacks of pulpwood of different mean mid-diameters (taking 15 cm. as the standard), and a table and graphs are given showing this relation for sorted and unsorted stacks for mid-diameters ranging from 8 to 20 cm., and the relation between the number of pieces/m³t and the solid volume relation. Time studies on the machine barking at the mill and the final hand barking showed that both time and cost/m³t decreased with increasing diameters.

53. Special Measurements of Trees and Stands (Crown Dimensions, Stand Density etc.)

See Nos. 1360, 1571, 1612, 1617, 1857.

54. Assessment of Site Quality

See also Nos. 1132, 1558, 1823, 1865, 2340.

1849. Skogsmark och bonitering i de nordiska länderna: definitioner och metoder. **[Forest sites and site quality classification in the Scandinavian countries: definitions and methods.]** *Repr.* from *Svenska SkogsvFören. Tidskr.* 52 (3), 1954 (189–226). [Sw.]

Terms and concepts used in Denmark, Finland, Norway and Sweden are defined, discussed and compared. Short papers by *J. A. Løvengreen* (Denmark), *Y. Ilvessalo* (Finland), *A. Langsæter* (Norway) and *C. Carbonnier* (Sweden) are given as appendices. The work was carried out under the auspices of the Nordisk Skogsunion.

1850. BARNES, R. L., and RALSTON, C. W. **Soil factors related to growth and yield of Slash Pine plantations.** *Tech. Bull. Fla. agric. Exp. Sta.* No. 559, 1955. pp. 23. 6 refs.

Cf. *For. Abstr.* 16 (No. 4397).

1851. WARRACK, G. C., and FRASER, A. R. **Estimation of site quality in juvenile Douglas Fir stands.** *Res. Note B.C. For. Serv.* No. 28, 1955. pp. 5. 2 refs.

Experiments were made with a method of assessing site index (S.I.) of young (40–87 years) even-aged stands of Douglas Fir, by measuring the length of span between the first whorl above b.h. and the 4th or 6th node above it. Data from 36 plots (10 trees measured in each) were analysed. Separate relationships between 4- and 6-node span distances and S.I. values were derived in the form of linear regressions (S.I. = 18·4 (4-node span length) + 37, and S.I. = 11·5(6-node span length) + 26) both of which were highly significant. It is recommended that the 6-node span measurement should be preferred to the 4-node span, except on stands too young to have developed the necessary whorls above b.h. The method can be used as an adequately reliable aid in classifying young stands for management purposes.

56. Increment. Development and Structure of Stands

See also Nos. 1299, 1300, 1302, 1304, 1309–10, 1359, 1408, 1419, 1451–4, 1458, 1560, 1568–74, 1612, 1794, 1875.

1852. GODMAN, R. M., and GREGORY, R. A. **Seasonal distribution of radial and leader growth in the Sitka Spruce–Western Hemlock forests of South East Alaska.** *J. For.* 53 (11), 1955 (827–33). 2 refs. [Alaska Forest Research Center, Juneau.]

Tables and graphs are given, analysing the weekly radial growth changes (+ or −) in $\frac{1}{10,000}$ inch, using Daubenmire's dendrometer [cf. *For. Abstr.* 7 (No. 446)]. Old- and second-growth *Picea sitchensis*, *Tsuga heterophylla*, and *Thuja plicata* at Juneau and Hollis were measured, leader growth is included and the growing seasons are divided into the number and % of days in which the pre-grand, grand and post-grand periods of growth occur. This information is significant for the choice of date for measuring sample plots.

1853. BARNES, R. L. **Growth and yield of Slash Pine plantations in Florida.** *Res. Rep. Fla. Sch. For.* No. 3, 1955. pp. 23.

A study was undertaken to establish the relationships of growth and yield to age, spacing, and site quality. The first part of the report describes methods of determining site quality for Slash Pine plantations. The second part presents growth and yield data based on 101 sample plots in unthinned plantations.

1854. PARDÉ, J. Études sur la production de quelques peuplements naturels de mélèze (*Larix europaea* D.C.) en France. **[Studies on the yield of some natural stands of *L. decidua* in France.]** *Ann. Éc. Eaux For., Nancy* 14 (2), 1955 (319–77). 33 refs. [F.e.g.]

Data, set out in numerous tables and graphs, are derived from studies since 1927 of 3 ha. of permanent plots of natural Larch stands in the Hautes-Alpes (1800–5900 ft.). German formulae for calculating yield are not applicable to such stands, in which e.g. bark amounts to 25% of total stem volume. In these plots m.a.i. is 1–3 cu.m./ha. up to at least 200 years. Outside its natural range, Larch may grow faster, but m.a.i. falls off relatively early, often before 100 years.

1855. SPEE, H. J. GRAF VON. Wuchs- und Holzeigenschaften des Riesenlebensbaumes (*Thuja plicata* Lamp.) auf deutschen Anbauflächen. **[Growth and wood properties of *T. plicata* in plantations in Germany.]** *Mitt. dtsch. dendrol. Ges.* (*Jb. 1953/54*) No. 58, [1955?] (142–8). [G.]

A summary, by the author, of his dissertation under the same title [see *For. Abstr.* 16 (No. 4461)].

1856. SETTEN, G. G. K. **A note on the growth and yield of Berus (*Bruguiera cylindrica* (L.) Bl. (syn. *Bruguiera caryophylloides* Bl.) in Selangor.** *Res. Pamphl. For. Res. Inst., Kepong* No. 16, 1955. pp. 12 + 4 photos + 4 gphs. + 4 tbls.

561. Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology

See also Nos. 1696, 1852, 1940.

1857. MATHAUDA, G. S. **Application of Gehrhardt's formula to abnormally stocked Deodar crops in the Himalayas.** *Indian For.* 81 (11), 1955 (701–4). 3 refs.

The applicability of Gehrhardt's formula ($g = dG(1 + k - kd)$; where g and G are b.a. increment of understocked and fully stocked crops respectively, d is the ratio of the density of the understocked crop to normal density, and k is an empirical constant) for determining the increment of understocked crops in terms of that of fully stocked crops, has been tested on 4 sample plots of *Cedrus deodara* specially laid out for the purpose in 1940. The sample-plot data (tabulated) show that the formula does not hold good for Deodar in the Himalayas.

566. Yield Tables and Their Construction

1858. OSMASTON, F. C. **Thoughts on yield tables.** *Forestry* 28 (2), 1955 (117–24). 3 refs.

The author examines the recently published Forestry Commission Record, *Revised Yield Tables for Conifers in Great Britain* [cf. *For. Abstr.* 15 (No. 2758)], and shows how the standing volume, basal area, numbers of trees, and mean quarter-girth vary with the mean top-height, irrespective of age and quality class. By analogy with the Indian Forest Record, *Multiple Yield Tables for Deodar* (*Cedrus deodara*), he concludes that treatment does not materially affect this relationship. A modified yield table for Sitka Spruce based on mean top-height only, is given. *From author's summary.*

1859. Ertragstafeln für Fichte und Eiche. [**Yield tables for Spruce and Oak.**] *Holz-Zbl.* 81 (145), 1955 (1730). [G.]

For use in the forthcoming revaluation of German forests, the Federal Ministry of Food, Agriculture and Forestry has issued (1) a table for Oak, heavily thinned, Class IV, extrapolated from Wiedeman, 1920/46 tables, (2) a table for Spruce, moderately thinned, Class 1A (i.e. better than I) after his 1936 tables.

1860. STAEBLER, G. R. **Extending the Douglas-Fir yield tables to include mortality.** *Proc. Soc. Amer. For. 1954*, 1955 (54–9). 9 refs.

American yield tables for even-aged stands traditionally have presented only net yields (the volume in live trees) whereas full production of the site (gross yield) includes also the volume of trees that die. Gross-yield tables prepared for Douglas-Fir show that this previously omitted production represents substantial volumes. Volume of normal mortality was established from the number of trees that die, calculated from yield-table information, and an average volume per tree from an analysis of permanent-sample-plot data. Resultant tables show that periodic mortality will reach ½ cord/acre annually in cordwood-size trees on site class II at about 40 years, and 150 bd. ft./acre in sawlog-size trees at about 70 years. After 100 years, mortality averages about 470 bd. ft./acre annually. The tables should aid foresters planning systematic salvage. The gross-yield tables may be used as an approximation of yields and growth rates to be expected under a high level of management. As such, they are useful tools for the forester in setting rotations and preparing thinning schedules. Where the full gross yield is realized, it is shown that culmination of m.a.i. is delayed 20–30 years; rotations may be extended even longer with little sacrifice of increment. Use of gross increment as the full growth capacity of the site permits the forester to calculate the expected results of transferring this growth to trees of his choice through thinning. *From author's summary.*

568. Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.

See also Nos. 1387, 1548.

1861. PIKE, R. T. **Yield of White Spruce and Balsam Fir in an undisturbed stand, Duck Mountain, Manitoba.** *Tech. Note For. Br. Can.* No. 11, 1955. pp. 3.

Data, tabulated for 1921 and 1946, for a 0·6-acre plot of 30- to 140-year Spruce above Fir, on an island. During the 25 years the number of trees fell from 600 to 227, total volume from 4090 to 3523 cu. ft./acre. Further reports are promised at 10-year intervals.

1862. MATHAUDA, G. S. **The constitution and rate of growth of a tropical moist deciduous forest in South Chanda Division, Madhya Pradesh.** *Indian For.* 81 (10), 1955 (604–19 + 1 gph). 6 refs.

Data from a sample plot which has been in existence since 1931 have been analysed and it is shown that uneven-aged crops in a state of equilibrium in such forests, like those in the tropical wet evergreen Ghat forests, obey the law of de Liocourt (that the number of trees in successive diameter classes of a balanced uneven-aged diameter distribution represents a geometrical series). The basal area and volume/acre of the growing stock and their rate of growth have been determined and compared with those in the tropical wet evergreen type and Teak and Sal uneven-aged crops of comparable site quality. The average rates of growth of the 17 commonest tree species have been determined and are presented in tabular form.

1863. LENGER, A. À propos d'une loi mathématique simple concernant la structure équilibrée des peuplements forestiers. [**A simple mathematical law concerning the equilibrium constitution of forest stands.**] *Bull. Inst. agron. Gembloux* 23 (3), 1955 (284–300). 7 refs. [F.] E.M.B.

[Cf. *For. Abstr.* 16 (No. 3286).] A further study of the formula of H. A. Meyer, with an exposition of the use to which it can be put in practice.

569. Increment; Development and Structure of Stands: Miscellaneous

See also Nos. 1363–4.

1864. RUTTER, A. J. **The relation between dry**

weight increase and linear measures of growth in young conifers. *Forestry* 28 (2), 1955 (125–35).

Briefly examines a number of measurements of growth and dry weight of young crops of *Pinus sylvestris* and *Picea sitchensis*, and concludes that, at any time before the canopy is closed, dry weight is more closely related to basal diameter than to height.

58. Surveying and Mapping. Aerial Surveys

See also Nos. 1828, 1839–40.

1865. HARTMANN, F. Standortskartierung nach forstökologischen Standortstypen in Österreich. **[Site mapping according to 'forest-ecological' site types, in Austria.]** *Zbl. ges. Forstw.* 73 (4), 1954 (199–233). 19 refs. [G.]

The procedure here suggested is based on the principles and methods laid down in the author's '*Forstökologie*' [cf. *For. Abstr.* 14 (No. 1867)]. Site 'categories' based on general characteristics, e.g. growth region, altitude, broad geological group, are subdivided by position, initial soil material and, above all, water regime, into 'forest-ecological' site types. From a careful analysis of soil, humus and vegetation of representative sites, ideally comprising all possible stages and conditions of these, 'monographs' are prepared in the form of keys based on easily ascertainable characteristics and showing also the effect of various species, mixtures, stand structures etc., based, where possible, on site history, and making recommendations for the most suitable treatment. Local site maps can then be prepared by less highly qualified personnel. It is suggested that site-category boundaries etc., be indicated by coloured lines, site types according to water regime by different colour washes, and site or soil conditions and other variables by different hatchings, dots etc. and symbols. [Cf. *For. Abstr.* 17 (No. 1377).]

1866. **Forest survey in Japan.** Forestry Agency, Tokyo. [*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/47, 1955. pp. 11.

1867. **Forest survey by aerial photography [in Japan].** Forestry Agency, Tokyo. [*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/45, 1955. pp. 16.

A short illustrated account of the use of aerial photographs in forest surveys in Japan.

1868. **Use of aerial photographs for forest inventory in Iraq.** [*Docum.*] *1st Sess. FAO Near East For. Comm., Teheran 1955* No. *FAO/NEFC*/13-*J*. Annexe II, 1955. pp. 2. Limited distribution.

1869. BERGEROO-CAMPAGNE, B. Inventaire des forêts tropicales par photographies aériennes. **[Enumeration surveys of tropical forests, based on aerial photographs.]** *Bois For. Trop.* No. 43, 1955 (3–7). [F.]

A short general discussion of the usefulness of aerial surveys, and notes on the possibility, in tropical conditions, of identifying forest types on aerial photos, and using them in establishing reserves, forest compartments etc.

1870. CHASE, C. D., and SPURR, S. H. **Photo interpretation aids.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 38, 1955. pp. 13.

A list of N. American photo-interpretation aids classified under the headings: lens stereoscopes, reflecting stereoscopes, parallax devices, linear and multiple-use scales, area-measurement aids and miscellaneous; with brief descriptions and information on price and supplier or manufacturer. The list is restricted to inexpensive items.

1871. GORDEEV, P. V. Izučenie lesosyrjevyh baz pri pomošči aksonometričeskoĭ aèrofotos'emki. **[Survey of exploitable forests with the aid of oblique aerial photography.]** *Lesn. Prom.* 14 (6), 1954 (4–9 + 2 photos). [Russ.] L.S.

Describes a method of forest survey, using aerial photographs (scale 1/500–1/1000) taken at an angle of 45°. In order to produce photographs uniform in scale over the whole area, the slit-chamber aerophotogrammetric camera AŠČAFA-2 is used. This and the surveying operations are described. It is claimed that this (axonometric) method of aerial survey enables the height of trees, their diameters, and the total stand volume to be evaluated with accuracies within, respectively, 7%, 3–5%, and 10%.

1872. MACANDREWS, F. D. **Average height weighted by volume in air photo interpretation.** *Tech. Note For. Br. Can.* No. 17, 1955. pp. 11.

Average height weighted by volume was adopted by the Forestry Branch some years ago instead of simple mean stand height, for purposes of photo interpretation. Curves and a chart designed to help the photo-interpreter in assessing this value are illustrated and explained.

1873. KRAUSE, W. Pflanzensoziologische Luftbildauswertung. **[Plant-sociological interpretation of aerial photographs.]** *Angew. PflSoziol., Stolzenau* No. 10, 1955. pp. 57. 8 refs. [G.g.]

A general review of this problem, with particular reference to possibilities in Germany. After introductory sections, the first major section discusses features that may be used in the indirect recognition of natural and artificial plant communities within the chief 'landscape' [*Landschaft*] complexes, viz. those characterized by typical Oak/Hornbeam (*Querceto-Carpinetum typicum*; continental loess landscape), fresh mixed Beechwoods (*Q.-C. elymetosum*; landscape of recent Baltic moraines), Oak/Birch (*Q.-Betuletum*; Atlantic sand landscape), and Beech (*Fagetum*; montane deciduous-forest landscape), with a few notes on similar prospects for Mediterranean landscapes. Further sections deal with the technique of aerial sketching and photography (in general terms only), with principles and details of interpretation, and possible working procedures.

In general, the argument is that although plant communities are seldom directly identifiable on aerial photos with sufficient certainty for ecological interpretation, it is nevertheless possible, with previous knowledge from ecological ground surveys, to identify the limited number of communities that follow patterns which are characteristic, though perhaps intricate, within each landscape complex.

If a landscape complex is correctly recognized in an aerial photo, and if reliable ground surveys exist for an essentially similar landscape, it becomes possible to interpret details by indirect evidence. Since aerial survey is usually undertaken for land that is inaccessible or difficult to survey on the ground, special difficulties may require individual solution and no ready-made scheme can be laid down for the working procedure in all cases.

1874. HEINSDIJK, D. **Forest type mapping with the help of aerial photographs in the tropics.** *Trop. Woods* No. 102, 1955 (27–46). 6 refs.

On the basis of 6 years' work in field sampling and photo study of the Surinam and Amazon forests, the author discusses with diagrams the difficulties, pitfalls, and some of the solutions for topographical mapping and typing of dense forests from aerial photographs. The diagrams show the obscuration of ground and water by tree crowns, the lack of correlation between canopy and ground levels, types of canopy and crown image, and an ecological scheme showing the transition from mixed tropical rain forest with groups of dominants to less favoured types characterized by single dominants. Tables showing stratification and diameter frequencies from extensive sampling are given and crown/d.b.h. ratios discussed. Main conclusions are: (*a*) Pure and less mixed types each have their canopy image and are easy to map; (*b*) the identification of a species on a photograph is highly speculative; (*c*) in the high dry-land forest, group identification can be narrowed by eliminating the lower-storey trees, but inventory is spoiled if an immature dominant or an economic species occurs in the lower storey; (*d*) in the mixed forests of Surinam and the Amazon, characteristic compositions showing distinct groups of dominant species are constant over wide areas, mostly on 'senile' soils. J. S. Beard's designation of Evergreen seasonal forest [cf. *For. Abstr.* 6 (p. 149)] is most correct for this type.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. Forest Management: General, Theory and Principles

See also Nos. 1693, 1863.

1875. PETKOV, P. D. Izsledvanija vărhu tehničeskata zrelost na smărčovite nasaždenija u nas i preporăki za opredeljane turnusa na sečta. **[Investigations on the technical maturity of Spruce stands in Bulgaria and indications for determining the rotation.]** *Nauč. Trud. lesoteh. Inst. Sofia* No. 3, 1954 (1–52). 12 refs. [Bulg.russ.]

Data from 107 plots in the Rila-Rhodope forests, smoothed with the aid of Tjurin's yield tables, were used for preparing fresh tables by the same methods as for *Pinus sylvestris* [see *For. Abstr.* 16 (No. 2076)]. The results show that there is no essential difference in the technical maturities of assortments or groups of assortments as between Pine and Spruce.

62. Working Plans. Annual or Periodic Yield. Yield Regulation

See also No. 1863.

1876. HENRY, J. L. **Sustained yield management of hardwood forests in New South Wales.** *Aust. For.* 19 (1), 1955 (45–59).

A brief history of sustained yield management of hardwood forests in New South Wales is given. The following points are then discussed: Methods of volume table construction; Various methods of sampling and the analysis of same; Methods of calculation of yields for final fellings; Methods of calculation of yield for intermediate fellings or thinnings; Introduction of a silvicultural system; Compartment history sheets; and Implementation of plan. *Author's summary.*

1877. PETRINI, S. Avverkningsberäkning vid taxering. **[Calculating fellings during evaluation.]** *Svenska SkogsvFören. Tidskr.* 50 (4), 1952 (299–318). [Sw.sw.]

Discusses the choice of season for assessing the growing stock, and allowance to be made according to the season chosen. Two formulae are presented.

$$(1)\ m = \frac{k\,(1 + \frac{t}{2} \cdot 0 \cdot 0p)}{t}$$

where m is the amount to be felled annually, k growing stock at the beginning of the period, t the number of years, and p the increment %. This formula must be adjusted for longer periods, with higher rate of increment (2–3%); for a 25-year period $\frac{t}{2} = 12$, for a 30-year period $\frac{t}{2} = 14$ and for a 40-year period (even at 1% increment) $\frac{t}{2} = 19$ are suitable adjustments. (2) Where thinnings are involved, compound interest is used in calculating increment:

$$m = \frac{k\ 1 \cdot 0p^t - K}{t\ 1 \cdot 0p^{t/2}},$$

where K is the volume (usually per ha.) desired at the end of t years. This formula is sufficiently accurate for a 10-year period, but longer periods should be broken up, for increment rates above 5% for a 20- or 2% for a 30-year period.

1878. TIWARI, S. D. N. **The working capital and other formulae for the yield regulation in selection forests [in India].** *Indian For.* 81 (11), 1955 (690–700). 7 refs.

The workability of Brandis' and Smythies' formulae for yield regulation in selection forests has been reviewed, and a new formula with more universal application and able to deal with more diverse types of crops has been evolved. It has been

shown that smooth working in the selection forest depends much more on the working capital, in the shape of class-I trees, than on the rates of recruitment to class I from different classes. A formula to find working capital has also been given.

Hitherto the felling cycle has been fixed just by giving a few reasons of convenience in working of the forest for long or short periods or in relation to the number of girth classes, but it has been shown that a long felling cycle may not be possible in view of the existing depleted stock in some forests, except at the cost of reducing the permissible yield. A formula for finding the longest possible felling cycle with the calculated maximum yield has also been given. *From author's summary.*

1879. TREPP, W. Das Einrichtungsverfahren im Kanton Graubünden. **[Management procedures in Grisons.]** *Öst. Vjschr. Forstw.* 96 (3), 1955 (189–203). [G.]

Describes the cantonal organization of management by the *méthode du contrôle*, particularly the cooperation of the central department with district officers and local authorities in periodic enumerations, production of plans, fixing of the annual fellings etc., and gives data on the forests of the canton and their development, including distribution of the main species. The development of the communal forest of Scharans, from the first enumeration in 1889 to the 3rd revision in 1952, is cited as an example.

1880. DAVIS, D. **Basic plan for exotic softwood planting in Kenya.** Government Printer, Nairobi. 1955. pp. 16.

Summarizes prescriptions for planting under the 1946 Development Plan and the 1954 Resettlement Project (6000 acres/year each). Data are given by the 5 Divisions, by districts, felling series, area planted (1954), area available, annual area (softwoods and hardwoods) by *taungya* (3 years) and bush planting [by groups on steeper land]. Details of rotations and intended % of Pines, Cypress etc., in the project are mentioned.

1881. NICKERSON, D. E., and VINCENT, A. B. **A summary of the management plan for the Green River Area, New Brunswick.** *Tech. Note For. Br. Can.* No. 7, 1955. pp. 31.

The Green River Management Area (ca. 240,000 acres) was established in 1944 as a long-term experiment to discover if the risk of loss from budworm epidemics could be reduced by controlled pulpwood fellings on a 20-year cycle. The plan, of which this is a summary, was completed in 1950.

64. Forestry as a Business: General

1882. OHSAKI, R., and MATSUMOTO, T. **[Indications from an actual study of the proper size of farm forests. Pilot study in Nakutamura, Gumma Prefecture.]** *For. [industr.] Econ., Tokyo* 8 (8; 9), 1955 (1–12; 1–14). [Jap.]

Based on a detailed analysis of village economy and the needs that a forest can serve.

65. Special Business Problems of Timber-Growing. Calculations of Costs and Profitability. Valuation

See also Nos. 1422, 1424–5, 1465, 1571, 1628, 1738–9, 1875.

1883. DAVIS, P. W., and GRANT, G. C. **Survey of private forestry costs in Scotland: 3rd annual report for forest years 1952–53 and 1953–54.** Department of Forestry, University of Aberdeen. 1955. pp. 69. Price 6*s.* 6*d.*

Cf. *For. Abstr.* 15 (No. 1678).

1884. HEINSTEDT, D. Produktionskostnader vid framställning av skogsplantor. **[Costs in the production of forest plants.]** *Från skogsvårdsstyrelsernas arbetsfält* pp. 7*–27*. *Suppl.* to *Svenska SkogsvFören. Tidskr.* 51 (2), 1953. [Sw.]

Discusses the various costs involved and gives graphs showing the costs per 1000 plants for 10 nurseries of areas ranging from 0·83 to 12·96 ha. and for different plant spacings. Gives examples of calculating production costs in order to determine prices.

1885. TIRÉN, L. Om kostnaden för sådd och vissa andra föryngringsmetoder. **[Costs of sowing and other methods of regeneration.]** *Medd. SkogsforsknInst., Stockh.* 45 (11), 1955. pp. 63. 21 refs. [Sw.sw.e.] Price *Kr.*3.

Data from studies on costs and times of sowing, using different tools (e.g. Mo & Domsjö pick, ordinary mattock), different sowing methods (patch sowing, broadcast sowing, etc.), or different mulchings (e.g. with ant-hill soil, or peat litter), of burning, of planting by different methods, of tractor cultivation, of planting under shelterwood etc., and of the differences of cost at day rates and piece-work rates, are given in graphs and tables, with English legends, and discussed. It is concluded that all the methods are economically justified except possibly planting in holes at day rates. There are great variations in costs, and costs can be reduced by changing from day to piece-work rates, by using machines and by natural regeneration under shelterwood. There is a 7-page English summary and a summary table in English.

1886. VIGNOLI, L. Nuovo metodo rigoroso e celere per ottenere il valore economico del danno causato da distruzione di soprassuolo di bosco ceduo. **[A new, accurate, and rapid method of assessing the economic loss caused by the destruction of the crop in a coppice stand.]** *Monti e Boschi* 6 (10), 1955 (473–4). [It.]

Discusses the possibility of constructing tables from which to calculate the loss involved by cutting or otherwise destroying coppice at any time during the fixed rotation.

1887. WILKES, G. C. **Forest fire risks in forest valuations.** *For. Chron.* 31 (3), 1955 (254–67). 15 refs.

The influence of the risk of fire loss is important in forest valuations. Risks that cannot be covered by insurance are usually provided for in the interest rate used in calculations of the forest's value. The

simplest estimate of the risk of loss from forest fire is the actual average annual burning rate for the forest area—if such specific information exists. The author suggests a method of roughly estimating the forest fire risks for different types of forests in different parts of Canada on the basis of the published work on forest fire protection standards by H. W. Beall. The report shows how the estimate of risk may be incorporated in the interest rate used in the evaluation of the forest. *From author's summary.*

66. Costing of Logging Operations

See Nos. 1644, 1646, 1889.

68. Administration and Organization of Forest Enterprises

685. Planning and Organization of Telecommunications

1888. MOUTON, G. Transmissions forestières. **[Forest telecommunications.]** *Rev. for. franç.* 7 (13), 1955 (927–37). [F.]

Gives an account of the development of communications in the Forest of Fontainebleau, by successive systems of overhead telephone, underground telephone, and radio transmission.

686. Planning and Organization of Buildings, Transport Installations (Roads etc.)

1889. VADNAL, A. Lokacija vzporednih produktivnih gozdnih transportnih žil. **[The [optimum] distribution of economic parallel forest roads.]** *Gozd. Vestn.* 13 (7), 1955 (193–200). 1 ref. [Sloven. f.]

Assuming that (1) the forest is a rectangle with a slope allowing transport by gravity, (2) the quantity by volume of timber to be transported from a unit area is a function of the altitude, (3) the operating costs of transport are proportional to the volume transported and the length of lead, the author gives the following general solution for the problem of optimum distribution of n parallel forest roads; the operating costs of transport are lowest when the altitudes $x_0, x_1 \ldots x_{n-1}$ of the roads conform to the equation $f(x_{i+1}) = f(x_i) + (x_i - x_{i-1})\, m(x_i)$, where $i = 0, 1, 2, \ldots n - 1$, the m function being the quantity by volume of timber to be transported from a unit area, and the f function its indefinite integral.

1890. SHERRY, S. P., and STEWART, M. A. **Planning and construction of roads on Wattle estates.** *Rep. Wattle Res. Inst. S. Afr. 1954/55*, 1955 (29–36 + 6 photos).

Based on an ideal plan for typical estate topography, the lay-out for gentle gradients, downhill loaded haul, and for a maximum extraction distance of 50 yards (bark and timber) is shown. Methods of construction and detailed costs are also given.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

71. Marketing of Forest Products: General

See Nos. 2245, 2315.

72. The Quantitative Aspects of Marketing. Demand, Consumption and Supply

See also Nos. 2063, 2304.

1891. PÖNTYNEN, V. Tutkimuksia Helsingin polttoainehuollosta. **[Studies of the fuel supply of the city of Helsinki.]** *Commun. Inst. for. Fenn.* 43 (2), 1954 (1955). pp. 236. 158 refs. [Fi.e.]

All tables (23) and diagrams (18) have English legends.

1892. ERVASTI, S. Suomesta pohjanmeren maihin vuosina 1920–1952 viety havusahatavara: koostumuksen muutokset. **[Export of sawn softwood from Finland to the North Sea countries in 1920–1952: changes in composition.]** *Repr.* from *Acta for. fenn.* 64 (2), 1955. pp. 203. 12 pages of refs. [Fi.e.]

1893. Statistiques relatives à la production et aux échanges de bois tropicaux en 1953. **[Statistics on production and trade in tropical timbers in 1953.]** *Bois For. Trop.* No. 43, 1955 (37–47). [F.]

Statistics based on a questionnaire by OEEC, showing imports of logs and sawn timber by different European countries, and production and exports from the Belgian Congo, Ivory Coast, Nigeria, Tanganyika, Malaya, Sarawak, N. Borneo, Br. Honduras, Br. Guiana, Fr. West Africa, Cameroun, Fr. Equatorial Africa, Madagascar, Mozambique and Angola.

1894. THIRAWATANA, S. **[The position of timber exports from Thailand.]** [*Bulletin*] *Royal Forest Department, Ministry of Agriculture, Bangkok* No. *R.*15, 1954. pp. 190. [Siam.]

A detailed account, with numerous tables (some with English as well as Siamese text), under the following main heads: Quantity of Teak exported compared with other species; Developments in the production of other species; Future importance of other species; Current position (quality and quantity) of exports of other species; List of importing countries; Softwoods and hardwoods [explaining preference of colder countries for softwoods]; Present demand for hardwoods; Development of exports of species other than Teak; Decline in the export market for other species and means of reversing this; World exports of species other than Teak; Comparison between the characteristics of Thai and foreign timbers.

74. Trade Policy

1895. **Fair trade commission's report [for Eire].** *Timb. Tr. J.* 215 (4126), 1955 (94–5, 98). 2 refs.

Summarizes the report and lists 9 practices now prohibited in Eire by ministerial order under the Restricted Trade Practices Act 1953. These practices are considered inimical to the public interest. They cover resale price fixing and price lists, boycott,

restriction of supply channel, exclusion of new trades, rings, and unfair differentiation against purchasers in rebates, discounts etc.

1896. **Detrimental finding on six associations in N.S.W. timber monopoly enquiry report.** *Aust. Timb. J.* 21 (8), 1955 (716 . . . 743).

A summary of the 385-page report issued in the interim on behalf of the Attorney General, which declares 6 associations to be monopolies and/or combinations referred to in the Monopolies Act.

1897. GUPTA, M. **Firewood control in Uttar Pradesh [India].** *Indian For.* 81 (11), 1955 (712–4).

A short account of Government control of supply and prices.

78. Economics of Transport

See Nos. 1644, 2181.

1898. **Bill of lading clauses.** *Timb. Tr. J.* 215 (4127), 1955 (83–5). 2 refs.

Details of a judgement given for breach of contract in failing to deliver timber to the contract port.

79. Economics of the Wood Industries

See Nos. 1754, 2010, 2063, 2202, 2315.

8. FOREST PRODUCTS AND THEIR UTILIZATION

1899. KÅSA, J. Skognytting. **[Forest utilization.]** H. Aschehoug and Co. (W. Nygaard), Oslo. 2nd ed. (rev.) 1952. pp. 373. [Nor.]

Contains sections on: the technical properties of wood; exploitation (preparatory work, felling, measuring, and land transport); marketing (selling, measurement); floating; sawmills (tools and equipment, technique, stacking, output, wood waste, kiln-drying, planing, preservation); charcoal and wood tar production; wood products (round timber, converted timber, other wood products, pulp and paper, fuel, tanbark); administration and labour.

1900. **Wood handbook: basic information on wood as a material of construction with data for its use in design and specification.** *Agric. Handb. U.S. Dep. Agric.* No. 72, 1955. pp. 528. 440 refs. Price $2·00 (paper cover).

Covers properties of timber, grading, gluing, preservative treatment, painting and finishing, seasoning, as well as constructional use. There are also sections on plywood, fibreboard etc.

1901. **[The 100th commemoration number.]** *Wood Ind., Tokyo* 10 (7), 1955. [Jap.] P.R.

The 100th commemoration number, all in Japanese, with 4 main sections: (1) Progress of wood technology in Japan for the last 10 years (short articles on sawmilling, timber drying, veneer and plywood, preservation and fireproofing, fibre- and chipboard, resin-treated wood, pulp, furniture, finishings and fittings, laminated wood. (2) Prospects for wood technology in Japan for the next 10 years (articles as above and also on woodworking machinery, instruments for measurement, gluing, finishing, and plastics. (3) Education [training,] for wood technology (3 articles) and (4) State policy for wood technology (articles on timber production and trade, and on manufacture of wood products).

1902. ***Derevoobrabatyvajuščaja Promyšlennostj.*** Ministerstvo Bumažnoĭ i Derevoobrabatyvajuščeĭ Promyšlennosti, Moscow. Monthly. Price *Roubles* 5 per single copy. P.R.

Previously *Derevopererabatyvajuščaja i lesohimičeskaja Promyšlennostj.* Vol. 4, No. 1, under the new title ['The Woodworking Industry'], was issued in January, 1955. Citation in *For. Abstr.*: *Derev. Prom.*

1903. KISSER, J. Das Österreichische Holzforschungsinstitut in Wien. **[The Austrian Timber Research Institute in Vienna.]** *Schweiz. Z. Forstw.* 106 (1), 1955 (49–57). [G.g.]

81. Wood and Bark: Structure and Properties

1904. TRENDELENBURG, R. [Revised by MAYER-WEGELIN, H.] Das Holz als Rohstoff. **[Wood as a raw material.]** Carl Hanser Verlag, Munich. 2nd ed., 1955. pp. 541. 26 pp. of refs. [G.] Price *DM*.38.50 [£3. 11*s.* 6*d.*].

The new edition [cf. *For. Abstr.* 1 (p. 201)] consists of the following sections: (1) Timber production (the forest as source of raw material, exploitation, production in the world as a whole, in Europe, and in Germany); (2) Use of wood (extent and development of use by industries, demand and supply); (3) Wood growth and structure; (4) Chemical composition; (5) Wood as a porous material (distribution of solid matter, air and moisture, heartwood and sapwood, varying moisture content, changes in wood after felling); (6) Density; (7) The annual ring; (8) Stem structure (stem form, pruning and branchiness, distribution of e.g. sapwood and heartwood and wood of different density in the stem, barking).

1905. Terminologia de madeiras. **[Wood terminology.]** *Especificacão, Laboratorio Nacional de Engenharia Civil, Lisboa* No. *E*31–1954 (Série B–Secção 1), 1955. pp. 64. 14 refs. [Port.]

A list of 344 terms with definitions, and an alphabetical index in Portuguese, French and English.

810. General Information on Woods

See also Nos. 1265–6, 1289, 1303–4, 1306–8, 1855, 2301, 2304.

1906. **Nomenclature of commercial timbers, including sources of supply.** *Brit. Stand.* No. 881 & 589, 1955. pp. 144. Price 15*s.*

Differs from previous editions in that the timbers (hardwoods and softwoods separately) are arranged alphabetically under the botanical, not the standard, names. There is an enlarged index of standard and other names. The average weight at 15% m.c. is

given for the first time, with notes on pronunciation of some standard names.

1907. RENDLE, B. J. **The classification and nomenclature of commercial timbers.** *Wood* 20 (12), 1955 (481–3). 20 refs.

Contains explanatory notes on the form of *Brit. Stand.* Nos. 881 and 589: 1955 [see preceding abstract], and discusses the principles and difficulties of international standardization. The British pioneer lists have been followed in other countries and a bibliography of 20 such officially sponsored lists from the 5 continents is appended.

1908. **Specimen woods Nos. 238–240.** *Suppls.* to *Wood* 20 (10–12), 1955. Each pp. 2.

Elgon Olive (*Olea* (*Steganthus*) *welwitschii*); Tali (*Erythrophleum guineense*); and Muhuhu (*Brachylaena hutchinsii*).

1909. **[Japanese woods.]** *Suppls.* to *Wood Ind., Tokyo* 10 (2–12), 1955. Each pp. 2. [Jap.] P.R.

Pinus pentaphylla, Sciadopitys verticillata, Fagus crenata, Quercus crispula, Fraxinus mandshurica, Betula maximowicziana, Tilia japonica, Kalopanax ricinifolium, Cyclobalanopsis acuta, Zelkova serrata, and *Cercidiphyllum japonicum.*

1910. D. Drei Andamanen-Importhölzer. **[Three imported timbers from the Andamans.]** *Holz-Zbl.* 81 (145), 1955 (1729). 5 refs. [G.]

Describes *Terminalia bialata, Canarium euphyllum,* and *Diospyros marmorata,* including nomenclature, habitat, timber properties and uses.

1911. D. Drei nordamerikanische Cedar-Hölzer. **[Three North American 'Cedar' timbers.]** *Holz-Zbl.* 81 (132/133), 1955 (1567). 8 refs. [G.]

A description of *Chamaecyparis lawsoniana, Juniperus virginiana* and *Libocedrus decurrens,* including nomenclature, timber properties, uses and grading rules.

1912. D. Die Forst- und Holzwirtschaft Ecuadors. **[Forestry and timber industry in Ecuador.]** *Holz-Zbl.* 81 (155/156), 1955 (1847). 5 refs. [G.]

Gives the distribution of some 20 native commercial timbers, their trade and scientific names, colour, weights and uses, and some trade statistics.

1913. MAYER-WEGELIN, H. Europäische und japanische Lärche. Ihre kennzeichnenden Holzeigenschaften. **[The characteristic timber properties of *Larix decidua* and *L. leptolepis*.]** *Holz-Zbl.* 81 (145), 1955 (1727–9). 11 refs. [G.]

In the course of his review the author mentions experiments by himself and H. Zycha, still in progress, according to which the heartwood of Japanese Larch is less resistant to fungal rot than that of European Larch.

1914. **Properties of thinnings of home-grown Lodgepole Pine (*Pinus contorta*). Progress report 1—Consignment No. 821.** Forest Products Research Laboratory, Princes Risborough. 1955. pp. 8 + 3 photos.

The timber is comparable to *Pinus sylvestris* in its seasoning and working properties and its strength is roughly the same as that of Canadian *P. contorta.*

1915. **Properties of thinnings of home-grown Douglas-Fir (*Pseudotsuga taxifolia*). Progress report 3—Consignment No. 823.** Forest Products Research Laboratory, Princes Risborough. 1955. pp. 11 + 12 photos.

1916. FERNANDO, X. M. **Notes on Ceylon timbers: *Artocarpus nobilis*.** *Ceylon For.* (*n.s.*) 2 (2), 1955 (85–7). 9 refs.

1917. STEPHENS, M. **The timber Machang (*Mangifera foetida*).** *Malay. Forester* 18 (4), 1955 (205–7).

Results of tests of physical and mechanical properties of timber from 6 trees (24–28 in. d.b.h.).

1918. STEPHENS, M. **The timber of Membatu (*Shorea guiso*) (Red Balau).** *Malay. Forester* 18 (4), 1955 (207–8).

Results of tests of physical and mechanical properties of timber from 3 medium-sized trees.

1919. Okan (Adoum). **[*Cylicodiscus gabunensis*.]** *Bois For. Trop.* No. 43, 1955 (11–14). [F.]

Botanical description, distribution, silvicultural characters, and uses and properties of wood.

1920. Faro. **[*Daniella thurifera*.]** *Bois For. Trop.* No. 44, 1955 (17–20). [F.]

1921. La page des bois tropicaux. Tola (ou Agba). **[Tropical woods. *Gossweilerodendron balsamiferum*.]** *Rev. Bois Appl.* 10 (9/10), 1955 (33). [F.] P.R.

1922. WYK, J. H. VAN. **Physical and mechanical properties of the woods of *Manilkara cuneifolia* and *Baikiaea minor* from Uganda.** *Trop. Woods* No. 102, 1955 (50–4). [Forest Products Institute, Pretoria.]

Covers native names, characteristics, macroscopic structure and recommended uses, with tables of sp. gr., and shrinkage and mechanical properties.

1923. **Timbers of New South Wales. Red Stringybark.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 8 (3/4), 1955 (3–6).

Distribution, botanical description, wood anatomy, utilization, and physical and mechanical properties of *Eucalyptus macrorrhyncha.*

811. Structure. Identification

See also Nos. 1270, 1359, 2113.

1924. CHALK, L. **A review of the changes in the terminology of wood anatomy.** *Trop. Woods* No. 102, 1955 (1–11). 34 refs. [Imperial Forestry Institute, Oxford.]

Work on rays, vertical parenchyma, vessels, fibres etc. done since the publication in 1933 of the *Glossary of terms used in describing woods* and the choice of the new anatomical terms entailed, are discussed as a contribution to the proposed revision of the glossary. An illustrated version of this in several languages is the ultimate plan.

1925. PECK, E. C. **Drying and protection of wood items in original round form.** *Rep. U.S. For.*

Prod. Lab., Madison No. 1187 (rev.) 1955. pp. 12 + 11 photos + 2 dgms. + 1 tbl. 4 refs. P.R.
Cf. *For. Abstr.* 7 (No. 1330).

1926. JOHNSTON, D. R. **Structure drawings to 'Specimen woods'.** Sheets 52–54. *Wood* 20 (10–12), 1955 (396; 434; 484).
(52) Andaman Marblewood (*Diospyros marmorata*), Catalpa (*Catalpa speciosa*), Wandoo (*Eucalyptus redunca* var. *elata*), and Totara (*Podocarpus totara*).
(53) Rimu (*Dacrydium cupressinum*), Serrette (*Byrsonima spicata*), 'Rhodesian Teak' (*Baikiaea plurijuga*), and Cape Beech (*Rapanea melanophleos*).
(54) Danta (*Cistanthera papaverifera*), Sepetir (*Sindora* sp.), Ilomba (*Pycnanthus angolensis*), and Lolagbola (*Pterygopodium oxyphyllum*).

1927. REED, C. F. **The comparative morphology of the Olacaceae, Opiliaceae and Octoknemaceae.** *Mem. Soc. broteriana* 10, 1954/1955 (29–79 + 13 plates). Many refs. [E.]
A taxonomic study based on morphological characters and certain anatomical characteristics of the wood.

1928. HOFMANN, E. Über die Anatomie einiger Hölzer der Quarnero-Insel Cherso. **[The anatomy of some woods from the island of Cherso.]** *Zbl. ges. Forstw.* 74 (2), 1955 (98–110). 7 refs. [G.]
Describes the following woods from shrubs forming a peculiar dwarf association on 'Arabia petraea', the rocky coast of this North Adriatic island: *Juniperus oxycedrus*, *Prunus spinosa dasyphylla*, *P. mahaleb*, *Crataegus transalpina*, *Cytisus spinescens*, *Rhamnus rupestris*, *Cotinus coggygria* [*Rhus cotinus*], *Punica granatum*, *Vitex agnus-castus*, and *Paliurus spina-Christi*.

1929. NILVISET, C. **[The identification of Oak wood.]** *Vanasarn* 12 (1), 1954 (59–62). [Siam.e.]
According to the recent Botanical Survey reports, the Oaks of Thailand may be grouped into 3 genera, viz. *Quercus* (Section *Lepidobalanus* (8 spp.), Section *Cyclobalanopsis* (ca. 25 spp.)); *Lithocarpus* (ca. 72 spp.); and *Castanopsis* (ca. 15 spp.) but their wood structure cannot be used to identify individual species. The author reports briefly on his examination of 32 [unspecified] specimens of Oak wood collected by the Forest Research Branch from various parts of Thailand. As regards wood structure, only one of these belonged to the conventional Red Oak group, the rest being of the Live Oak group.

811.1. Anatomical Elements and Tissues

See also Nos. 1299, 1743, 1935–7, 1956, 1978, 1999–2000, 2130.

1930. CHATTAWAY, M. M. **Crystals in woody tissues; Part I.** *Trop. Woods* No. 102, 1955 (55–74). 4 refs. [Division of Forest Products, C.S.I.R.O., Melbourne.]
This paper is the first part of a survey of the occurrence of crystals in woody tissues. Lists are given of genera and species in which the following types of crystals occur: druses; raphides; elongated or rod-like; acicular; crystal sand types. The distribution of the crystals in rays and/or vertical parenchyma is indicated together with the type of cells in which they occur. *From author's summary.*

1931. MARTS, R. O. **Some structural details of Douglas-Fir pit membranes by phase contrast.** *For. Prod. J.* 5 (5), 1955 (381–2). 5 refs.
The accompanying photograph reveals apparent perforations in pit membranes of Douglas Fir earlywood tracheids, and the distortion of the tori to block the pit openings.

1932. MARTS, R. O. **Fluorescence microscopy for measuring fibril angles in Pine tracheids.** *Repr.* from *Stain Technology, Geneva, N.Y.* 30 (5), 1955 (243–8). 2 refs. P.R.
Observations and measurement of fibril angles in increment cores or similar small samples from living Pine trees was facilitated by the use of fluorescence microscopy. Although some autofluorescence was present, brighter images could be obtained by staining the specimens with a 0·1% aqueous solution of a fluorochrome. Staining for 2–5 min., followed by a 5- to 10-sec. washing in distilled water and drying 15 min. at 190–195° C., prepared radially split surfaces of specimens for microscopic observation with ultra-violet light. Measurement of fibril angles, important for the determination of wood strength and the properties of its pulp, was made with a protractor eyepiece. Photomicrography was feasible also, and the need of preparing microtome sections was obviated. *From author's summary.*

1933. ECHOLS, R. M. **Linear relation of fibrillar angle to tracheid length, and genetic control of tracheid length in Slash Pine.** *Trop. Woods* No. 102, 1955 (11–22 + 2 photos). 24 refs. [School of Forestry, Yale University.]
A highly significant direct linear relation between fibrillar angle (θ in degrees) and tracheid length (L in mm.) in *Pinus elliottii* was established as $\theta = 50{\cdot}12 - 7{\cdot}94\,L$. This was true for the late wood in all rings at all levels from 1 to 24 ft. No direct relation was found between ring width and L. L appears to be under rigid genetical control, governed by a multiple-gene series, and breeding for greater L should be feasible. Open pollination tended to give progeny with average L. L was measured from photographs and θ from the orientation of the long axis of pit-mouths and from cleavage planes.

811.2. Special Features and Abnormal Structure

See also No. 2000.

1934. REINDERS-GOUWENTAK, C. A. **The storied-structure features and the taxonomic rank of the Leguminous taxa.** *Acta bot. neerland.* 4 (3), 1955 (460–70). 8 refs. [E.e.] O.B.D.
From the point of view of wood anatomy, the taxa may be (1) elevated to family rank, (2) divided into three subfamilies, or (3) divided into two families, viz. Mimosaceae and Papilionaceae, the latter family subdivided into two subfamilies. Which

classification is desirable cannot be decided at present, though the distribution of the major storeyed-structure features might be in favour of (3). [Cf. *For. Abstr.* 17 (No. 788).] *From author's summary.*

1935. Chalk, L., Marstrand, E. B., and Walsh, J. P. de C. **Fibre length in storeyed hardwoods.** *Acta bot. neerland.* 4 (3), 1955 (339–47). 12 refs. [E.e.] [Imperial Forestry Institute, Oxford.] O.B.D.

Measurements of the lengths of wood fibres and of parenchyma strands were made in 3 species with storeyed structure, *Pterocarpus angolensis*, *Nesogordonia* [*Cistanthera*] *papavifera* and *Aeschynomene elaphroxylon*. Within the growth ring, fibre length rose to a maximum in the middle of the ring and dropped abruptly at its boundary, but the length of the parenchyma strands remained constant. Neither the fibres nor the parenchyma strands showed any general tendency to increase in length from the pith outwards. *Authors' summary.*

1936. Wardrop, A. B., and Dadswell, H. E. **The nature of reaction wood. IV. Variations in cell wall organization of tension wood fibres.** *Repr.* from *Aust. J. Bot.* 3 (2), 1955 (177–89 + 7 plates). 25 refs. (*Repr. For. Prod. Aust.* No. 254.)

[Cf. *For. Abstr.* 14 (No. 2612).] The cell-wall organization, the cell-wall texture, and the degree of lignification of tension-wood fibres, have been investigated in a wide variety of temperate and tropical species. Following earlier work describing the cell-wall structure of tension-wood fibres, two additional types of cell-wall organization have been observed. In one of these, the inner thick 'gelatinous' layer which is typical of tension-wood fibres exists in addition to the normal three-layered structure of the secondary wall; in the other only the outer layer of the secondary wall and the thick gelatinous layer are present. In all the tension wood examined the micellar orientation in the inner gelatinous layer has been shown to be nearly axial and the cellulose of this layer found to be in a highly crystalline state. A general argument is presented as to the meaning of differences in the degree of crystallinity of cellulose. The high degree of crystallinity of cellulose in tension wood as compared with normal wood is attributed to a greater degree of lateral order in the crystalline regions of tension wood, whereas the paracrystalline phase is similar in both cases. The degree of lignification in tension-wood fibres has been shown to be extremely variable. However, where the degree of tension-wood development is marked, as revealed by the thickness of the gelatinous layer, the lack of lignification is also most marked. Severity of tension-wood formation and lack of lignification have also been correlated with the incidence of irreversible collapse in tension wood. Such collapse can occur even when no whole fibres are present, e.g. in thin cross-sections.

Microscopic examination of collapsed samples of tension wood has led to the conclusion that the appearance of collapse in specimens containing tension wood can often be attributed in part to excessive shrinkage associated with the development of fissures between cells, although true collapse does also occur. Possible explanations of the irreversible shrinkage and collapse of tension-wood fibres are advanced. *Authors' summary.*

1937. Dadswell, H. E., and Wardrop, A. B. **The structure and properties of tension wood.** *Holzforschung, Berlin* 9 (4), 1955 (97–104). 17 refs. [E.e.g.] P.R.

The structure of tension wood (t.w.) is discussed with particular reference to cell-wall organization and lignification. Three different types of t.w. fibres have been observed; in each of these the typical gelatinous layer is present, but the number of other layers of the secondary wall varies, as does their degree of lignification. The fine structure of the gelatinous layer has been studied under the electron microscope and the highly crystalline state of the cellulose in this layer revealed by X-ray methods. The correlation between t.w. development and degree of lignification has been noted and it has been suggested that lack of lignification may well be the first stage in t.w. formation. The common occurrence of microscopic compression failures in t.w. fibres has been stressed and a possible explanation for this phenomenon given. Reference has been made to such properties of t.w. as woolliness of the grain, high longitudinal shrinkage and collapse, and the association of these with features of cell-wall organization and degree of lignification discussed. *Authors' summary.*

1938. Jutte, S. M., and Isings, J. **The determination of tension wood in Ash with the aid of the phase-contrast microscope.** *Experientia, Basle* 11 (10), 1955 (386–7). 8 refs. [E.e.g.] [Forest Products Research Institute, T.N.O., Delft.] O.R.S.

Contrast staining with chlor-zinc-iodine, phloroglucin-hydrochloric acid or safranin-fast green failed to indicate the presence of tension wood at the upper side of an excentric branch, diameter 3 cm. Cross-sections measuring 5μ from the upper, and for comparison the lower, side of the branch were examined in a phase-contrast microscope. This showed a gelatinous layer characteristic of tension wood in the section from the upper part of the branch; this gelatinous layer contained a substance with a refractive index of 1·536. Cross-sections with and without tension wood are shown in photomicrographs.

1939. Scott, D. R. M., and Preston, S. B. **Development of compression wood in Eastern White Pine through the use of centrifugal force.** *For. Sci.* 1 (3), 1955 (178–82). 9 refs.

Reviews the literature and describes an experiment in which potted *Pinus strobus* plants with their stems supported were subjected on a turntable to centrifugal force simulating that of gravity. Compression wood (illustrated by photomicrographs) was developed. It is concluded, in conjunction with other experimental evidence, that gravity may be the sole factor responsible for compression wood.

811.4. Growth Rings. Early and Late Wood

See also No. 1959.

1940. Harris, E. H. M. **The effect of rainfall on the late wood of Scots Pine and other conifers in**

East Anglia. *Forestry* 28 (2), 1955 (136–40 + 1 plate).

In *Pinus sylvestris* near Oxford, early wood was found to start growing at about the beginning of April, late wood at about the beginning of July, and growth ceases at about the end of August. Five late-wood types were distinguished in Pine growing under the 'continental' climatic conditions of East Anglia. These types appear to be related to rainfall distribution. The sharpness of the inner edge of the late wood depends upon the availability of water at the end of early-wood formation, a dry spell causing a sharp distinction. Wet conditions in the middle of the late-wood formation may cause a zone of less dense tissue, but this is rare. *Author's summary.*

811.7. Phloem. Bark

See also Nos. 1225–6.

1941. BUVAT, R. Évolution du liber de *Robinia pseudoacacia.* **[Development of the phloem of *R. pseudoacacia.*]** *C.R. Acad. Sci., Paris* 241 (21), 1955 (1492–5). 2 refs. [F.f.] O.R.S.

1942. CHATTAWAY, M. M. **The anatomy of bark. V. *Eucalyptus* species with stringy bark.** *Repr.* from *Aust. J. Bot.* 3 (2), 1955 (165–9 + 2 plates). 6 refs. (*Repr. For. Prod. Aust.* No. 253.)

The persistent loose and fibrous nature of the bark of certain rough-barked Eucalypts arises through the expansion of the phloem parenchyma, which causes the bundles of fibres to become widely separated from one another in the rhytidome. This expansion, which may increase the cells to many times their original size, takes place after the periderm has formed, and immediately precedes the death of the cells and their transformation into rhytidome. This feature is not confined to the series Pachyphloiae (Stringybarks) but also occurs in several related series, and in some of the rough-barked Bloodwoods. [Cf. *For. Abstr.* 16 (Nos. 4492–4).] *From author's summary.*

1943. CHATTAWAY, M. M. **The anatomy of bark. VI. Peppermints, Boxes, Ironbarks and other Eucalypts with cracked and furrowed barks.** *Repr.* from *Aust. J. Bot.* 3 (2), 1955 (170–6 + 4 plates). 7 refs. (*Repr. For. Prod. Aust.* No. 253.)

Examination of a large number of species showed that the furrowed barks are due to cracks which extend through the rhytidome to the outermost phloem. In Peppermints and Boxes the cracks, which extend into the outer layers of the phloem, originate in the wedges of parenchyma that develop towards the periphery of the living phloem. In the Peppermints the furrows are schizogenous in origin. In the Boxes they are more often lysigenous, the direction of the crack often being determined by the lysigenous kino pockets that form in the outer phloem. In the Ironbarks they are also lysigenous, the cell breakdown occurring most often in the inner layers of the wide rhytidome and only occasionally in the outer phloem. Much of the width of the rhytidome observed in many Boxes and Ironbarks is due to a wide phellem; their hardness is due to kino which occurs either as cellular kino or as large pockets formed by the breaking down of tissues of the outer phloem. [Cf. preceding abstract.] *From author's summary.*

1944. ESAU, K., and CHEADLE, V. I. **Significance of cell divisions in differentiating secondary phloem.** *Acta bot. neerland.* 4 (3), 1955 (348–57 + 2 plates). 9 refs. [E.e.] O.B.D.

Among 91 species in 77 genera of 44 families of dicotyledons surveyed in the present study, 35 species showed evidence that various anticlinal divisions occur in the secondary phloem mother cells that produce sieve elements. These divisions range in orientation from transverse through oblique to vertical. The derivatives of these divisions consist of two or more sieve elements with their companion cells or of combinations of sieve elements, companion cells, and parenchyma cells. Frequently the divisions result in sieve elements shorter than their mother cells. The occurrence of these anticlinal divisions has a bearing upon the problem of phylogenetic and physiologic specialization of sieve elements. *Authors' summary.*

1945. HUBER, B., and JAZEWITSCH, W. VON. Zur Entwicklungsphysiologie der *Prunus*-rinde. **[The physiology of development in bark of *Prunus*.]** *Acta bot. neerland.* 4 (3), 1955 (385–8 + 3 plates). 9 refs. [G.g.] [Forstbotanisches Institut, München.] O.B.D.

Undulations in the fascicular bark tissue of *Prunus* are probably the result of radial cleavage, which was found to be already present in one-year-old shoots. *From authors' summary.*

812. Physical and Mechanical Properties

See also No. 2199.

1946. LÁNYI, J. A gyantászott erdeifenyö müszaki tulajdonságai. **[The technical properties of the [wood of] tapped Scots Pines.]** *Erdész. Kutatás., Budapest* No. 4, 1954 (81–90 + smries. in suppl.). [Hu.e.g.russ.]

Results of sampling wood from different levels and parts of the stem show that, in Pine tapped normally—i.e. in Hungary, for 3–5 years—the wood does not become resin-soaked except for a 1- to 2-mm. strip close to the face. The quantity of resin, however, (*a*) increases in the lower part of the stem and decreases in the upper, (*b*) tends to even out in sap- and heartwood. The sp. gr. of the tapped wood also increases somewhat, Brinell hardness decreases by 1–2% and shrinkage improves. Bending-strength tests produced contradictory results except for impact bending, where strength was much reduced. It is concluded that normally tapped Pine can be safely used for contructional work of all sorts except possibly as poles, when difficulties of impregnation must be faced.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also No. 2209.

1947. NAMBIYAR, V. P. N. **Anomalous reaction of wood on photographic emulsions.** *Curr. Sci.* 24 (7), 1955 (225–6). 4 refs. A.P.B.

[Cf. *For. Abstr.* 14 (No. 2618); 16 (No. 4496).] In a previous note the author reported that the action of wood on different photographic emulsions did not run parallel to the photographic speed of the emulsion used. It was suggested that the inferior action observed in panchromatic and other high-speed plates might be due to the presence of dyes introduced to extend their range of spectral sensitivity. This hypothesis has since been tested and confirmed by experiments.

1948. **[The damping capacity of wood and composite wood.]** *For. Res. India Burma 1950–51, Pt. I*, 1955 (73–4).

The damping capacity (in flexure) of the species studied was ca. 3·5 times as great across the grain as along it. Values generally were much lower than those recorded by foreign observers for their species. *Pterocarpus macrocarpus* had the lowest value (0·01008) and *Diospyros* spp. the highest (0·02307). English Beech had a value of 0·269. Damping in torsion was 1·5–4·5 times that in flexure. Damping in torsion was investigated in laminated *Canarium* spp. glued with different adhesives. Casein-glued specimens showed highest damping capacity and lowest modulus of rigidity. Phenol-formaldehyde-glued specimens showed lowest logarithmic decrement and highest rigidity. [Cf. *For. Abstr.* 13 (No. 3311).]

1949. AMY, L. L'inflammabilité des matériaux et sa mesure. Applications à l'étude sur l'ignifugation. **[Inflammability of materials and its measurement. Applications to the study of fireproofing.]** *Chim. et Industr.* 74 (3), 1955 (526–36). [F.f.] D.S.I.R.

Discusses the part played by flame production in the process of igniting materials, and considers the following factors: (*a*) total heat energy emitted by the combustion in the flame, (*b*) the energy it emits when at a maximum, and (*c*) its initial velocity of propagation. So far, these factors are hardly known. The author suggests measuring at least the average height of the flame, as providing a very rough measure of its 'energy function', and gives graphs showing this height as a function of time for different power values of the 'epi-radiator' [radiant-energy source], and for a chipboard and 3-ply Okoumé. The results show a good reproducibility. The mechanism of flame production (gasification of the material and mixture of the gas products with air) is also discussed.

1950. HEARMON, R. F. S., and BURCHAM, J. N. **Specific heat and heat of wetting of wood.** *Nature, Lond.* 176 (4490), 1955 (978). 8 refs. [Forest Products Research Laboratory, Princes Risborough.]

Measurements of specific heat and heat of sorption of Beech sawdust give general agreement with the finding of Clarke and Kelsey for *Araucaria klinkii* [cf. *For. Abstr.* 16 (No. 4498)], which suggests that the specific heat of wood containing moisture will not depend greatly on species.

1951. KOLLMANN, F., and MALMQUIST, L. Untersuchungen über das Strahlungsverhalten trocknender Hölzer. **[Investigations on the behaviour of wood during drying toward radiation phenomena.]** *Holz Roh- u. Werkstoff* 13 (7), 1955 (249–58). 15 refs. [G.g.] P.R.

Experiments were made with samples of Birch, Beech, Spruce, Pine and Oak, (*a*) oven-dry and (*b*) of 10% moisture content (m.c.), in order to determine with great accuracy their coefficients of radiation. The radiation chamber (described) was calibrated by using a Perspex plate, blackened or coated with aluminium foil, as the irradiated body. The absorption coefficients for (*a*) were calculated from the heat balance, and for (*b*) from the initial drying rate. Drying curves for samples dried in a vacuum were calculated from the heat balance; plotted in dimensionless coordinates (relative residual m.c. *vs.* relative time), these curves represent all possible types of drying. Their power exponents are almost independent of temperature, but vary greatly from one species to another.

1952. **[Dielectric properties of some Indian species.]** *For. Res. India Burma 1950–51, Pt. I*, 1955 (73).

A few preliminary experiments were made on the dielectric breakdown strength of various species. *Zanthoxylum rhetsa*, *Tectona grandis* and *Dysoxylum malabaricum* had high breakdown strength, and *Pinus longifolia*, *Cedrela toona* and *Dalbergia sissoo* comparatively low strength.

1953. YOSHIMURA, N. **[A measurement of the radio-frequency power absorbed by a wood and wood-glue combination.]** *Wood Ind., Tokyo* 10 (5), 1955 (217–22). 12 refs. [Jap.jap.e.] P.R.

The R.F. power absorption of Redwood [*Sequoia sempervirens*?] measured by a directional coupler device (Micromatch unit) is in agreement with the theoretical thermal power input based on the heat required for moisture evaporation. The mean value of observed R.F. power was 7% greater than the mean calculated power. However, a 't-test' of the difference between the mean powers indicated that no statistically significant difference existed for the data obtained. The dielectric properties of a Blackgum [*Nyssa sylvatica*?] laminate varied with the presence or absence of glue and with changes in the temperature of the load and the state of the glue (liquid when uncured, solid when cured). The R.F. power absorption of a glued Blackgum laminate measured by a directional coupler device is in agreement with the theoretical power absorption indicated by the conventional dielectric heating formula when the dielectric properties employed in the calculation are those that were obtained at the end of the heating period. The mean value of observed R.F. power was 10% less than the theoretical power. However, a 't-test' of the difference between the mean powers indicated that no statistically significant difference existed for the data obtained. Under the test conditions employed in heating the Blackgum laminates, it was found that approximately 57% of the R.F. power was absorbed by the wood and 43% by glue. *From author's summary.*

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 1950–1, 2124, 2127, 2129–30.

1954. MATHEWSON, J. S. **Accuracy of electric moisture meter readings on Jack Pine posts.** *For. Prod. J.* 5 (5), 1955 (359–61).

The differences between mean moisture content (oven-drying method) values and moisture-meter readings taken at a depth of 1 in. ranged from 3·5 to 4·7% for a group of 7 posts, and 4·2 to 6·5% for a group of 13 posts. A resistance-type meter with a special electrode was used.

1955. ENČEV, E. A. Izučvanija vărhu ravnovesnata vlažnost na dărvesinata. [**Studies on the equilibrium moisture content of wood.**] *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (281–303). 36 refs. [Bulg.russ.]

Tests were conducted for 14½ months (*a*) in the attic space and (*b*) in ordinary room conditions, with the following woods: *Picea abies*, *Pinus sylvestris* (sapwood and heartwood) *Populus* sp., *Ulmus campestris*, *Fraxinus* sp., *Quercus pedunculata*, *Juglans regia*, *Fagus sylvatica* (normal wood, false heart and steamed wood), *Platanus* sp., *Acer pseudoplatanus*; and also with plywood, blockwood, blue-stained *Pinus sylvestris*, *Pinus nigra* with very resinous sapwood and heartwood, and samples of Spruce, Beech and *Quercus cerris* showing incipient decay. The samples were of two sizes (2 × 2 × 20 and 5 × 5 × 20 cm.). The results are tabulated and graphed. It was found that the higher the fibre-saturation point, the more rapidly is equilibrium reached and the smaller the hysteresis.

1956. MCINTOSH, D. C. **Shrinkage of Red Oak and Beech.** *For. Prod. J.* 5 (5), 1955 (355–9). 2 refs.

Develops an equation for determining the radial shrinkage of 'rayless' wood of both species. Results of tests to determine the longitudinal and tangential shrinkage of broad rays are given. Measurement data show the radial and tangential shrinkage of early and late wood of both species. *From author's summary.*

1957. SERGOVSKIĬ, P. S. Vlagoprovodnostj drevesiny. [**Moisture conduction of wood.**] *Derev. Prom.* 4 (2), 1955 (3–8). 12 refs. [Russ.] P.O.

Data in the available literature regarding the dependence of moisture conduction on the moisture content (m.c.) of wood are widely divergent: (1) Lykov (*Theory of drying*, Moscow, 1950; *Transport phenomena in capillary-porous materials*, Moscow, 1954) affirms that the m.c. has no effect on moisture conduction; (2) according to Arcihovskaja [see *For. Abstr.* 15 (No. 4051)], Ludwig (*Forschungsberichte Holz*, Heft 1, Berlin, 1933), and Stamm [see *For. Abstr.* 9 (No. 301)], the coefficient of conduction (*k*) attains its maximum at 14–18% m.c., while (3) Martleĭ [Martley] (*Wood seasoning*, Moscow, 1932), and Egner (*Forschungsberichte Holz*, Heft 2, Berlin, 1934) state that *k* rises continuously as the m.c. increases from 0 to the fibre-saturation point (f.s.p.). The author stresses that the term 'coefficient of moisture conduction', which characterizes the rate of moisture migration under the effect of the moisture gradient, has no physical meaning at m.c. > f.s.p.; it has, however, a practical significance for problems of wood seasoning. The author's experiments were based on both equilibrium-flow and unsteady-flow conditions. In the former the air in desiccators was subjected to constant circulation, the temperature was kept constant by means of thermo-regulators, and the cylindrical surface of the specimens was sealed with a special multi-layer coating. In the latter method, large specimens had their side surfaces covered with a moisture-proof and thermal-insulation coating, while the air humidity and temperature were automatically controlled; a special apparatus was designed for slicing the specimens rapidly into thin sections. Over 100 specimens (Pine, Beech, Oak) were tested at different temperatures and over 400 values obtained for *k*. The main moisture-conduction channels in wood are: (1) systems of macro-capillary tubes filled with air (i.e. cell lumina connected by pits), and (2) systems of cell walls. In the former, moisture migrates as vapour under the effect of the partial-pressure gradient. In the latter, the mechanism is much more complicated: besides the partial-pressure gradient of water vapour as the driving force for the moisture absorbed by the cell-wall substance, there is also the capillary-potential gradient for the migration of the liquid phase. Both gradients, however, depend on the moisture concentration, whose gradient in the wood is thus assumed to be the driving force for the moisture migration in cell-wall systems. Hence *k* represents the total effectiveness of the two fundamental moisture-conducting systems. The author found that *k* attains a flattened maximum at 22–24% m.c., the fall between ca. 22 and ca. 30% being more pronounced for Pine than for Beech and Oak. The existence of the maximum of *k* is explained thus: while the effectiveness of the second mechanism mentioned above, increases as the m.c. rises, that of the first mechanism decreases. The author has repeated Egner's experiments (*loc. cit.*) with improved insulation of the specimens, and obtained full confirmation of his own experiments. The dependence of *k* on temperature obeys the parabolic law. A comparative analysis of results of tests shows that, for a given temperature and a given direction of moisture flow, *k* does not depend on the species, but only on the 'conventional' [nominal?] density of wood, the relationship being $k = c + \gamma_{conv.}^{-n}$ where $\gamma_{conv.}$ is the 'conventional' density, and *c* and *n* are constants. The parameters of this equation were found to have one set of values for the heartwood of Pine and Oak, and another set for the sapwood of Pine, Oak and the normal wood of Beech, the respective curves (straight lines in log-log graphs) intersecting at $\gamma_{conv.} \approx 1{\cdot}05$ g./c.c. (for $t \simeq 50°$ C.). This finding is explained by the reduction, at greater wood densities, of the bore of the micro-capillary tubes, whereby the difference between heartwood and sapwood disappears. The density value at which this would occur was calculated from the formula

$$\gamma_{max} = \frac{100\gamma_{ws}}{100 + W_{fsp}\gamma_{ws}},$$

where γ_{ws} is the density of the wood substance

(1·54 g./c.c.), and W_{fsp}, the m.c. at f.s.p. (28% at 50° C.). The value of γ_{max} so obtained is 1·08 g./c.c.

Since moisture migration in the axial (longitudinal) direction has no technological significance, the radial and tangential directions were mainly investigated. The ratio k_r/k_t (coefficients of moisture conduction in radial and tangential direction respectively) was found to be 1·15 for Pine, 1·50 for Oak, and 1·70 for Beech. The following practical equations are given by the author for calculating the mean value of k_t in the range between m.c. 7–8% and f.s.p.: (*a*) for heartwood and ripewood $k_t = 0{\cdot}235 \times 10^{-31} \times T^{10} \times \gamma_{conv.}^{-3.3}$ sq. cm./sec., and (2) for sapwood and wood of 'sap' species [Beech] $k_t = 0{\cdot}235 \times 10^{-31} \times T^{10} \times \gamma_{conv.}^{-3.9}$ sq. cm./sec. For k_r/k_t the value of $(1 + \frac{2a}{100})$ is recommended where a is the % volume of rays in the total volume of the given wood species. Finally, k_l (longitudinal) $\approx 15\ k_t$.

1958. JOHANSEN, O. L., and KUMAR, V. B. **Diffusion of sodium chloride in wood fibre boards and plywood. Part 1. Diffusion through hardboards, wood and plywood. Part 2. Diffusion through surface coated boards.** *Norsk Skogind.* 9 (8), 1955 (282–8). 12 refs. [E.e.nor.] P.R.

Diffusion through hardboards varied with the quality of the board; boards sized with Holzrit (blood albumen and sulphite waste liquor) or unsized boards with a modulus of rupture of 400 kg./sq. cm. had a higher diffusion constant than boards sized with paraffin wax or unsized boards with a modulus of rupture of 450 kg./sq. cm. Diffusion through solid Pine tangentially and through Birch and Pine plywood was small compared with that through fibreboard; diffusion through Beech plywood was similar to that through good-quality fibreboard. Diffusion through fibreboards coated with different waxes or polyethylene was less at first but increased with time after treatment, that through boards coated on both sides with polyvinyl-acetate water emulsion or phenol-formaldehyde remained low, and that through boards coated with asphalt, polystyrene, or urea formaldehyde was high.

812.3. Density. Specific Gravity. Buoyancy

See also No. 1846.

1959. PILLOW, M. Y. **Specific gravity relative to characteristics of annual rings in Loblolly Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. 1989, 1955. pp. 8 + 3 dgms. 7 refs. P.R.

Studies on 5 sample trees of *Pinus taeda* showed that the mean specific gravity (sp. gr.) followed the general trends of % of latewood associated with factors of crown size and height up the tree. Sp. gr. increased in essentially linear relationships with increases in either % of latewood or numbers of annual rings/in.

812.7. Strength Properties

See also Nos. 1999, 2022, 2052, 2070, 2129–30, 2195, 2209.

1960. **List of publications on mechanical properties and structural uses of wood and wood products.** *Rep. U.S. For. Prod. Lab., Madison*, No. 200 (rev.) 1955. pp. 72. P.R.

Cf. *For. Abstr.* 16 (No. 2179).

1961. IVANOV, YU. [JU.] M. **The rupture of wood by repeated stressing beyond the limit of plastic flow.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2730, [*n.d.*] pp. 5 + 2 gphs. 5 refs. Transl. by R. Casan and N. H. Kloot from *Dokl. Akad. Nauk SSSR* 73 (5), 1950 (905–8). P.R.

1962. KOLLMANN, F., and NARAYANAMURTI, D. Verhalten einiger indischer Holzarten im feuchten Zustand im hochfrequenten Wechselfeld. [**Behaviour of some Indian wood species in moist condition in an HF field.**] *Holz Roh- u. Werkstoff* 13 (3), 1955 (91–4). 4 refs. [G.g.] P.R.

Presents in graphs the results of tests on 18 Indian woods to determine the modulus of elasticity (bending) as a function of temperature. Tables show the details of drying of these species in the HF field, and the plastic-flow temperature limits for green specimens when so heated.

1963. SEKHAR, A. C., and SHARMA, R. S. **Izod values of laminated specimen[s] and their variation with grain angle—some preliminary investigations.** *Comp. Wood* 2 (3), 1955 (63–9). P.R.

It was found that notched specimens cut from *Dalbergia sissoo* and *Cedrela toona* plywoods at angles of 0, 30, 45 and 60° to the face-veneer grain had Izod values less than those for solid wood specimens (radial or tangential), while, at 90°, the Izod value of plywood exceeded that of solid wood.

1964. LISKA, J. A. **Method of calculating the strength and modulus of elasticity of plywood in compression.** *Rep. U.S. For. Prod. Lab., Madison* No. 1315 (rev.) 1955. pp. 8 + 1 dgm., 1 gph., 3 tbls. P.R.

Cf. *For. Abstr.* 9 (No. 363).

1965. MAMADA, S. [**The resistance of wood to scratching with a razor.**] *Wood Ind., Tokyo* 10 (3), 1955 (113–5). 2 refs. [Jap.e.] P.R.

The relationship of scratching resistance to sp. gr. and hardness of the 10 hardwood species tested are given in graphs, closer relationships being found in tests ⊥ than ∥ to the grain. In tests on *Chamaecyparis obtusa* resistance increased with rising moisture content. Graphs and tables have English legends.

812.8. Workability. Working Properties

1966. SEKHAR, A. C. **Working qualities of some Indian timbers.** *Indian For.* 81 (11), 1955 (724–32 + 3 dgms.).

Describes the methods employed at the Forest Research Institute, Dehra Dun, to determine working and finishing qualities of wood, and gives the working qualities recently determined for *Acacia arabica*, *Artocarpus lakoocha*, *Cassia fistula*, *Dipterocarpus bourdilloni*, *D. indicus*, *Gardenia latifolia*, *Holarrhena antidysenterica*, *Melia azedarach*, *M. indica*, *Morus* spp., *M. laevigata*, *Prosopis spicigera*, *Sageraea listeri*, *Soymida febrifuga*, *Tectona grandis*, *Thespesia populnea*, and *Zanthoxylum* spp.

813. Wood Chemistry

See also Nos. 2197 *et seq.*

1967. MITCHELL, R. L. **Chemistry of Hickory.** *Hickory Task Force Rep. Stheast. For. Exp. Sta.* No. 2, 1955. pp. 12. 16 refs.

Presents tabulated data (previously published in other contexts) on the chemistry of the wood, bark, nuts and leaves as compared with those of other species, with suggestions for chemical utilization of waste Hickory wood. Species dealt with include both true and Pecan Hickories.

1968. **[Chemistry of sapwood and heartwood.]** *For. Res. India Burma 1950–51, Pt. I*, 1955 (74–5).

In sapwood and outer heartwood of *Cupressus torulosa*, the cellulose content increased and lignin content decreased, with height in tree; in the inner heartwood both decreased with height; pentosan content increased with height, slightly falling again at the top. In *Diospyros* sp. there was wide variation between sapwood and heartwood; the black wood was rich in extractives, poor in cellulose, and rich in lignin; the white wood was exactly the reverse. *Cedrela toona* had a fairly high pentosan content (17–18%), which may be responsible for its suitability for composite wood products.

1969. NARAYANAMURTI, D., and DAS, N. R. Die Abhängigkeit der chemischen Zusammensetzung des Holzes einiger indischer Holzarten von seiner Lage innerhalb des Stammes. **[Dependence of the chemical composition of the wood of some Indian species on position within the stem.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (52–6). 12 refs. [G.g.] P.R.

The wood of *Cupressus torulosa*, *Cedrus deodara*, *Shorea robusta* and *Dalbergia sissoo* was analysed for the usual constituents. The heartwood was found to contain more extractives than the sapwood, which is adduced to explain the better plasticization of heartwood in H.F. fields.

1970. WISE, L. E., and PICKARD, J. **Analysis of Tupelo woods.** *Tappi* 38 (10), 1955 (618–9). 6 refs. P.R.

Tabulates the results of analyses of representative samples of heartwood, and sapwood of *Nyssa sylvatica* and *N. aquatica*.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 1166, 1255, 1994, 1999.

1971. BROWN, S. A., and NEISH, A. C. **Studies of lignin biosynthesis using isotopic carbon. IV. Formation from some aromatic monomers.** *Canad. J. Biochem. Physiol.* 33 (6), 1955 (948–62). 37 refs. O.R.S.

Deals mainly with lignin biosynthesis in wheat, but also contains tabulated data on conversion of labelled compounds to lignin in *Acer negundo*, *Populus balsamifera*, and *Caragana arborescens*. [Cf. *For. Abstr.* 16 (No. 4528).]

1972. SMITH, D. C. C. **Contribution of residues containing carbonyl to the ultra-violet absorption of lignins.** *Nature, Lond.* 176 (4489), 1955 (927–8). 2 refs.

1973. SMITH, D. C. C. ***p*-Hydroxybenzoate groups in the lignin of Aspen (*Populus tremula*).** *J. chem. Soc.* July, 1955 (2347–51). [Low Temperature Research Station, Cambridge.] O.R.S.

The lignin contains *p*-hydroxybenzoate groups. They occur singly, involving aliphatic hydroxyl groups of the native lignin and account for about 10% of its weight. *From author's summary.*

1974. SCHUBERT, W. J., and NORD, F. F. **Investigations on lignin and lignification. XV. Heterogeneity of native and enzymatically liberated lignins as established by electrophoresis and paper chromatography.** *Proceedings, National Academy of Sciences of the United States of America, Chicago* 41 (3), 1955 (122–7). 12 refs. O.R.S.

Electrophoretic and chromatographic analyses both showed that native and enzymatically liberated samples of Oak and Birch lignin behaved as homogeneous preparations, while those of Scots Pine and bagasse lignin gave evidence of secondary components. Native and enzymatically liberated Maple lignins behaved as homogeneous preparations in electrophoresis, but a secondary component was shown by paper chromatography.

1975. BLAND, D. E., and STAMP, C. **Quantitative determination of lignin oxidation products by chromatography on paper impregnated with sodium tetraborate.** *Repr.* from *Aust. J. appl. Sci.* 6 (3), 1955 (353–8). 6 refs.

It is shown that vanillin, syringaldehyde, acetoguaiacone, acetosyringone and *p*-hydroxybenzaldehyde may be separated by chromatography on paper impregnated with $Na_2B_4O_7$, using methanol/isopropyl-ether/water (1/1/1) and methanol/benzene/water (7/7/10). These substances may be located on the sheet by inspection in ultra-violet light. A method for the determination of the first 3 substances by eluting from the paper with methanol and determining the optical density of their solutions at 300 mμ has been developed. It appears that there is nothing to hinder extension of the quantitative method to the last two substances. *Authors' abstract.*

1976. MCKENZIE, A. W., MCPHERSON, J. A., and STEWART, C. M. **The estimation of acid-soluble lignin.** *Holzforschung, Berlin* 9 (4), 1955 (109–12). 20 refs. [E.e.g.] P.R.

An analytical method is described. Arguments based on ultra-violet absorption data are not conclusive. The holocellulose estimation does not give a true measure of the total polysaccharides present in wood substance, because of the chlorination of the residual lignin and the removal of some carbohydrate material during holocellulose estimation; hence total polysaccharides should be estimated as the difference between 100% and total lignin. The evidence presented suggests that acid-soluble lignin is formed from the lignin present in the original wood. The chemical nature of soluble lignin is discussed. *From authors' summary.*

1977. STEWART, C. M., and MCPHERSON, J. A. **The non-resistant components of the wood of *Eucalyptus regnans* F. Muell. Part IV. Methanol**

and aqueous extractions of chemically modified wood substance. *Holzforschung, Berlin* 9 (5), 1955 (140–9). 27 refs. [E.e.g.] P.R.

[Cf. *For. Abstr.* 16 (No. 3394).] Holocellulose prepared from the wood substance of *E. regnans*, and the residue resulting from the treatment of the wood substance with aqueous 5% NaOH solution at 23° C., have been subjected to methanol extractions at 150° for increasing periods. The alkali treatment, while solubilizing little lignin, brings about the dissolution of all the polysaccharides which are non-resistant to the action of mildly acid media; these polysaccharides have been shown to consist of glycosan uronides built up from units of xylose, 4-0-methyl-*D*-glucuronic acid and, probably, of galactose. The methanol extraction solubilizes lignin according to an apparent retarded 1st-order reaction which proceeds at a rate only 20% slower than that observed for similar extractions of the untreated wood substance. Acids that are not volatile at 105° appear to be released as catalysts for the hydrolytic liberation of lignin. The results from the methanol extractions of holocellulose and of wood substance suggest that the presence of lignin has little effect on the action of the methanolic medium on the polysaccharides; however, the reactions appear to proceed at a somewhat faster rate in the absence of lignin. In general, the results indicate the existence of an intimate association between lignin and the non-resistant polysaccharides *in situ*; the nature of the association probably involves chemical bonding between these components rather than physical protection of the glycosan uronides by the lignin. The close association between lignin and the polysaccharides may extend to the resistant polysaccharides. *Authors' summary.*

1978. DOLMETSCH, H. Über die Struktur der Lockerstellen im fibrillären Gefüge der nativen Cellulosefasern. **[Structure of loose (weak) areas in the fibrillar texture of native cellulose fibres.]** *Holz Roh- u. Werkstoff* 13 (3), 1955 (85–91). 30 refs. [G.g.] P.R.

A critical survey of the various theories concerning the fine structure of these areas in native cellulose. They differ from the more resistant areas either by a smaller packing density or by the absence of cross bonds assumed to exist in the more resistant areas.

1979. BROUGHTON, G., HEEKS, R. E., and JOHANNES, C. **Methods for cellulose accessibility determination.** *Tappi* 38 (8), 1955 (498–502). 67 refs. P.R.

Methods so far used are reviewed, viz. physical (X-ray diffraction, infra-red absorption, density, water sorption, heat of wetting, and deuterium exchange), and chemical ones (acid hydrolysis, oxidation and esterification). Water-vapour sorption is considered to be suitable for study as a basis for a possible standard method.

1980. CLERMONT, L. P. **Fractionation and identification of the hemicellulose components of Black Spruce.** *Pulp Paper Mag. Can.* 56 (11), 1955 (107–14). 19 refs. [Forest Products Laboratory, Ottawa.]

Twenty fractions were isolated successively from the holocellulose by chlorinations (2), hot-water (4), 5% and 16% KOH (5 each), and $NaClO_2$ followed by 16% KOH again (4). Each contained xylose, arabinose, mannose, galactose and glucose, though in widely different proportions. The fractions showed wide differences in molecular weight, and investigations in progress on the nature of the chain molecules suggest that they are complex mixtures of polysaccharides. Chemical composition and viscosity show the presence and the separation in this fractionation of two predominating polymers based respectively on mannose and xylose.

1981. KÜRSCHNER, K. Ein rasches Verfahren zur quantitativen Pentosanbestimmung in Hölzern. **[Rapid method for quantitative determination of pentosan in wood.]** *Holzforschung, Berlin* 9 (5), 1955 (129–40). 94 refs. [G.g.e.] P.R.

After a brief survey of the processes presumed to occur when fural is formed through the hydrolysis of pentosans, and after a description of various methods of distillation and determination of the fural formed, a method is described in which the fural, liberated in a new process, is quickly removed from the reaction vessel by means of a CO_2 current and then precipitated with 2,4-dinitrophenylhydrazine. The monomers (xylose and arabinose) formed by the main representatives of wood pentosans give in this case the theoretical fural values. *From author's summary.*

1982. RÅNBY, B. G. Pentoser och pentosaner i trä; hemicellulosa. **[Pentoses and pentosans in wood; hemicellulose.]** *Svensk Kemisk Tidskrift, Stockholm* 66 (10), 1954 (275–86). 37 refs. [Sw.e.] L.S.

A review of present knowledge of the chemical structure, physical properties, occurrence, distribution in the cell wall, and technical importance in pulping, of xylans and arabogalactans.

1983. ROUDIER, A., and EBERHARD, L. **The hemicelluloses of Sea Pine wood (*Pinus pinaster* Soland.): separation of uronic and aldobiouronic acids obtained from these hemicelluloses through hydrolysis.** *Tappi* 38 (9), 1955 (156*A*–158*A*). 10 refs. P.R.

Presented at the meeting of the Tappi Overseas Discussion Group, Paris, 20–21 May, 1955. The separation was conducted by methods similar to those used by Gorrod and Jones [see *For. Abstr.* 16 (No. 2200)].

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also No. 2200.

1984. ZAVARIN, E., and ANDERSON, A. B. **Extractive components from Incense-Cedar heartwood (*Libocedrus decurrens* Torrey). III. Occurrence of libocedrol, a new phenol ether, and its *p*-methoxythymol addition complex.** *Repr.* from *Journal of Organic Chemistry* [*Baltimore*] 20 (6), 1955 (788–96). 10 refs.

Cf. *For. Abstr.* 17 (No. 840).

1985. RENNERFELT, E., and NACHT, G. **The fungicidal activity of some constituents from heartwood of conifers.** *Svensk bot. Tidskr.* 49 (3), 1955 (419–32). 16 refs. [E.e.] O.B.D.

The toxic effect of 20 heartwood substances on fungi was tested. Very active were γ-thujaplicin from *Thuja plicata* and nootkatin from *Chamaecyparis nootkatensis*; both these substances inhibit fungus growth at 0·001–0·002% concentrations. Pinosylvin, pinosylvin monomethyl ether (in heartwood of *Pinus* species) and chamic acid (from *Chamaecyparis nootkatensis*) inhibit fungi at 0·01–0·02%. *From authors' summary.*

1986. FREUDENBERG, K., and HARTMANN, L. Inhaltsstoffe der *Robinia pseudoacacia.* [**Constituents of *R. pseudoacacia.***] *Justus Liebigs Annalen der Chemie, Weinheim* 587 (3), 1954 (207–12). 12 refs. [G.] O.R.S.

The wood was found to contain ca. 2% free robinetin, and ca. 0·02% robinetin mixed with a second flavone colouring. Dihydro-robinetin constituted ca. 5·3% of the wood. This constituent inhibits the growth of *Poria vaporaria* and *Coniophora cerebella.* Robinetin and dihydro-robinetin are found mainly in the heartwood. The leaves were found to contain two glucosides. Saturated solutions of the glucosides in water inhibited germination of *Lepidium* but not of *Triticum.* This is not, however, adequate proof that the glucosides of the leaves are entirely responsible for the predominance of grasses and absence of dicotyledons under stands of *R. pseudoacacia.*

1987. HINO, I., and KATUMOTO, K. [**Notes on some properties of Brazilian woods. (2).**] *Bulletin of the Faculty of Agriculture, Yamaguti University, Simonoseki* No. 4, 1953 (203–7). 4 refs. [Jap.e.] H.S.B.

Extracts of 58 Brazilian woods were analysed by paper chromatography: the woods from 26 listed species were shown to contain flavonoid compounds.

1988. KING, F. E., CLARK-LEWIS, J. W., and FORBES, W. F. **The chemistry of extractives from hardwoods. Part XXV. (—)-epiAfzelechin, a new member of the catechin series [from ether-extracts of heartwood of *Afzelia* spp.].** *J. chem. Soc.* Aug. 1955 (2948–56). [The University, Nottingham.] O.R.S.

1989. MICHAEL, M., and WHITE, D. E. **The chemistry of Western Australian plants. IX. Extractives from the timber of *Eucalyptus diversicolor* F. Muell.** *Aust. J. appl. Sci.* 6 (3), 1955 (359–64). 7 refs. P.R.

Ellagic acid, a water-soluble tannin-containing fraction, and a red pigment have been isolated from fresh timber shavings. The pigment has a molecular weight of ca. 2300 ± 500 and may be represented by the rounded average formula $C_{110}H_{110}O_{50}$. Half the O atoms present can be acetylated and hence are probably present as OH groups, of which 18 appear to be phenolic, since they react with diazomethane. The pigment acetate contains four OCH_3 groups and a CO group has been characterized in the methyl ether. Two ester groupings are also indicated, leaving 16 oxygen atoms present in unreactive groupings. Ellagic acid has also been isolated from normal *E. regnans* timber, while pink specimens also contain a pigment that differs somewhat from that of *E. diversicolor. Authors' summary.*

1990. HASEGAWA, M., and SHIRATO, T. **Flavonoids of various *Prunus* species. IV. The flavonoids in the wood of *Prunus donarium* var. *spontanea*.** *J. Amer. chem. Soc.* 77 (13), 1955 (3557–8). 2 refs. [Meguro, Tokyo.] O.R.S.

Eriodictyol, genkwanin, sakuranin and a flavanone glucoside were isolated.

1991. LIVINGSTONE, R., and WHITING, M. C. **The structure of lapachenole, a hardwood extractive.** *J. chem. Soc.* Nov., 1955 (3631–6). [The University, Manchester.] O.R.S.

The name lapachenole is proposed for a substance found in *Paratecoma alba.* It may be the active factor causing dermatitis among users of the wood, but tests were inconclusive. Its structure has been elucidated as 4′-methoxy-6:6-dimethylnaphtho-(1′:2′-2:3) pyran.

1992. SANDERMANN, W., and BARGHOORN, A.-W. Über die Inhaltsstoffe von Makore- und Peroba-Holz sowie ihre gesundheitsschädigende Wirkung. [**Extractives of *Mimusops heckelii* and *Paratecoma peroba* wood and their injurious effect on health.**] *Holzforschung, Berlin* 9 (4), 1955 (112–7). 9 refs. [G.g.e.] P.R.

Bassic acid $C_{30}H_{46}O_5$ was found in the saponin isolated from *M. heckelii*, and lapachonone and a resin component accompanying it were found in *P. peroba.* All three compounds are strong skin irritants.

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

1993. [**Chemistry of thermal decomposition.**] *For. Res. India Burma 1950–51, Pt. I,* 1955 (75).

The thermal decomposition of *Alstonia scholaris, Dichopsis elliptica,* and *Tetrameles nudiflora* was investigated in the green state. The gases evolved between 230° and 300° C. were mainly CO_2 and CO. The % of CO was 42 in *D. elliptica,* 47 in *A. scholaris* and 56 in *T. nudiflora.*

1994. KRATZL, K., and SILBERNAGEL, H. Über das Verhalten von Buchenholz und -Lignin bei thermischer Behandlung mit Wasser. [**The behaviour of Beech wood and Beech lignin during thermal treatment with water.**] *Mitt. öst. Ges. Holzforsch.* 7 (5), 1955 (71–8). 12 refs. [G.g.] P.R.

When Beech wood or the HCl-lignin from it is heated, with or without water, to temperatures between 100 and 200° C., the yield of vanillin and syringaldehyde during oxidation with nitrobenzene and alkali strongly decreases. A polymer phenolic substance containing most of the OCH_3 appears instead of the phenolaldehydes. When Beech (or Spruce) wood is subjected to thermal treatment in water at 200° for 20 hours, some 50–60% is dissolved and 30–40% transformed into volatile products. The insoluble residue contains 70–75%

of the original OCH_3, and gives during oxidation little phenolaldehyde and much of the polymer phenolic substance. [Cf. *For. Abstr.* 14 (No. 3747).] *From authors' summary.*

813.8. Poisonous and Irritant Properties

See also Nos. 1991–2.

1995. BAUMER, M. Que faut-il croire de la toxicité de certains bois tropicaux? **[The toxicity of certain tropical woods.]** *Bois For. Trop.* No. 43, 1955 (27–36). 44 refs. [F.e.span.]

Reviews the literature and discusses the occurrence of toxic conditions (chiefly dermatitis) in people working with certain tropical timbers (e.g. *Metopium brownei, Cameraria belizensis, Eucalyptus hemiphloia, E. maculata, Dysoxylum muelleri, Peroba amarella, Antiaris toxicaria, Erythrophleum guineense, Gonioma kamassi*). There is considerable evidence to show that workers vary greatly in susceptibility to this type of dermatitis, which is much greater in Great Britain and France than in Italy, and in tall fair men than in short dark ones. Preventive measures are described.

814. Natural Durability. Old Wood. Fossilized Wood

See also Nos. 1985–6, 2054, 2113, 2145, 2158.

1996. **The rôle of ozone in the ageing of timber.** *For. Res. India Burma 1950–51, Pt. I*, 1955 (81).

It is known that during ageing (as distinct from seasoning) timber acquires special physico-chemical properties, and it is believed that the O_3 in the atmosphere plays a significant, if not the chief, role in their development. Early experiments in which timber was treated with synthetic O_3 with a view to hastening this ageing were mainly restricted to the surface. If green timber is dried in an atmosphere of O_3 by subjecting the entire space containing the timber to an electric field under optimum conditions for O_3 production, the reaction of O_3 on the wood substance will presumably be more thorough, and the treatment may increase decay-resistance. In order to test the validity of these assumptions, green specimens of *Pinus longifolia* and *Bombax malabaricum* kept in glass tubes were subjected to electrodeless discharge under constant suction of air at 5·5 cm. mercury pressure. Under these conditions, the O_3 produced was estimated to be 0·0009 g./hour. All specimens, together with controls, were laid in the yard during Feb.-March 1951. An examination in April 1951 showed that only the treated specimens were sound.

1997. SUESS, H. E. **Radiocarbon concentration in modern wood.** *Science* 122 (3166), 1955 (415–7). 7 refs. O.R.S.

Measurements on 4 trees (Alaska Spruce, Incense Cedar, White Pine and *Cedrela*) showed that wood formed within the last 50 years displayed marked variations in the direction of a lower C^{14} content. This is attributed to the introduction of a certain amount of C^{14}-free CO_2 into the air by artificial coal and oil combustion and to the rate of isotopic exchange between atmospheric CO_2 and the bicarbonate dissolved in the ocean.

815. Effect of Growth Factors on Structure and Properties

See also Nos. 1578, 1935, 1940, 1968–9, 2186–8.

1998. PECHMANN, H. VON. Aktuelle Probleme der forstlichen und holztechnischen Forschung. **[Current problems in forest research and wood technology.]** *Schweiz. Z. Forstw.* 106 (8), 1955 (441–60). 11 refs. [G.f.]

Discusses the influence of site, ecological factors, and heredity (e.g. natural pruning, branch formation) on wood quality, with examples of the effect of silvicultural measures on the timber properties of Oak and Ash.

1999. IABLOKOFF, A.-KH. Action des facteurs écologiques sur la structure et les propriétés mécaniques du bois d'épicéa (*Picea excelsa* Link.). **[The influence of ecological factors on the structure and mechanical properties of the wood of *Picea abies*.]** *Ann. Éc. Eaux For., Nancy* 14 (2), 1955 (277–318 + 4 photos). [F.e.g.]

A further account of studies already reported [cf. *For. Abstr.* 16 (No. 869)]. In addition to the influence of growth rate (measured by width of annual ring) on the dimensions and shape of tracheids in cross-section, the study demonstrated its effect on cell-wall properties which resulted in a lowering of mechanical strength as growth rate increased. Late growth from wide growth rings was shown to contain an excess of hemicelluloses.

2000. MARIANI, P. Accrescimento e caratteri istologici di un fusto eccentrico di *Larix europaea* D.C. **[Growth and histological characters of an excentric stem of *L. decidua*.]** *Ital. for. mont.* 10 (5), 1955 (216–24 + 4 photos). 9 refs. [It.it.f.] [University of Padua.]

An analysis was made of a markedly excentric stem of Larch, ca. 80 years old. It was found that the differences in increment between the long and short diameters increased with age. The % of wood with thick cell-walls was notably higher on the long radius, which is related to the formation of typical reaction wood on this radius. Examination of the dimensions of isolated fibre tracheids showed that those from the longer radius were always superior in length and breadth, both in early and in late wood. The variation in dimensions of fibre tracheids with age was, however, similar in the two radii.

82. Conversion, Shaping, Assembly and Finishing of Wood: General

2001. FRANZ, N. C. **An analysis of chip formation in wood machining.** *For. Prod. J.* 5 (5), 1955 (332–6).

A preliminary report on fundamental machining research. Photographic analysis of chip formation reveals the formation of basic chip types with associated surface characteristics. The following chip types are distinguished when cutting occurs parallel to the grain: (1) where splitting ahead may result in the defect 'chipped grain'; (2) where continuous diagonal shear produces excellent surface quality, and (3) where compression and shear failures in the wood often cause the resultant surface to be

fuzzy. Formation of a particular chip type is determined by a number of factors, some of which may be controlled. *From author's summary.*

2002. **High production woodworking machines: machines demonstrated at the Building Exhibition [London 1955].** *Wood* 20 (12), 1955 (494–7).

Describes with photographs 14 machines exhibited.

2003. **New machines and equipment: the woodworking machinery section at the Building Exhibition [Olympia, 1955].** *Wood* 20 (11), 1955 (460–4).

A brief account with illustrations of machinery exhibited by 18 firms.

2004. Hannover im Mittelpunkt des Interesses. **[Hannover [i.e. the Hannover Industrial Fair, 1955] as the centre of interest [: wood-working equipment etc.].]** *Int. Holzmarkt* 1955 (8), (11–26). [G.]

2005. **Hannover 1955 [: a further account of woodworking machinery, kilns etc. displayed.]** *Int. Holzmarkt* 1955 (12), (9–21). [G.]

2006. 60. Wiener internationale Messe. **[The 60th Vienna international fair.]** *Int. Holzmarkt.* 1954 (21), (11–21). [G.]

2007. Kossovskiĭ, G. N. Elektroiskrovoĭ sposob obrabotki derevoobrabatyvajuščego instrumenta. **[Electric spark method of treating woodworking tools.]** *Sbornik Ukr. NIIMOD, Kiev* 2, 1952 (131–52). [Russ.] From *abstr.* in *Prehl. lesn. Lit.* 6 (6), 1955 (No. 2328). [Slovak.] P.R.

Describes the method and apparatus whereby the service period of various woodworking tools is increased 2–6 times.

821. Barking

See also Nos. 1635–6, 2080.

2008. Zellstofffabrik Waldhof. Machine zum Entrinden und (oder) Entbasten von Hölzern. **[A machine for barking and/or removing the bast from wood.]** *Austrian Patent* No. 180,402, Dec. 10, 1954. pp. 5 + 6 dgms. [G.] P.O.

A barker having flexible beaters rotating on spindles that can be aligned as desired to the log surface.

2009. Miller, R. H. P. **Debarkers used in the South and East.** *Rep. U.S. For. Prod. Lab., Madison* No. 2038, 1955. pp. 18 + 12 photos. P.R.

Illustrated technical descriptions of: (*a*) sawlog barkers (Anderson barker, Nicholson Rotobarker, Soderhamn D-3 barker, and Hurricane barker); (*b*) pulpwood bolt barkers (Impco, Cambio, Burnt River, Carpenter, Crouse, and Peppy Peeler barkers); and (*c*) hydraulic slab barker.

2010. Parks, W. H. **Economics of debarking Redwood logs.** *For. Prod. J.* 5 (5), 1955 (317–22). 8 refs.

Describes, and discusses the merits of and suitable methods for, whole-log barking of Redwood logs. The benefits derived from whole-log barking more than offset the cost of any of the methods studied. Hand barking at prepared mill landings is most economical for mills with daily production $\geq$ 200,000 bd. ft.; above this figure hydraulic barkers promise to be more economical. *From author's summary.*

822. Saws and Sawing

See also Nos. 2056–8.

2011. Hyler, J. E. **Modern sawmilling, Parts 24–34.** *Sth. Lumberm.* 191 (2382–92), 1955, (63 . . . 66; 53 . . . 58; 47 . . . 50; 53–6; 45 . . . 48; 51 . . . 54; 49 . . . 52; 53 . . . 58; 41 . . . 44; 35–8).

Carriage feeds, dogs, knees and blocks, control equipment, set works, remote control.

2012. Thunell, B. Några synpunkter på inpostningsdonen i ramsågar. **[Saw hangers in frame saws.]** *Pap. ja Puu* 37 (12), 1955 (559–68). [Sw.e.] P.R.

Recommends the introduction of an elastic element into the hanger to compensate for changes in blade length at slightly varying stresses. Tests in the laboratory and in practice showed that the use of a spring wedge (illustrated) gave good results especially with screw hangers.

2013. Tendler, M. M. Gidroprivod dlja pod'ema verhnih valjcov lesoramy. **[Hydraulic device for raising the top feed-rollers of a saw frame.]** *Lesn. Prom.* 14 (4), 1954 (30–1). [Russ.] L.S.

Illustrated description of a hydraulic (oil) device for raising the feed rollers, adapted to the existing Soviet saw-frame RD-75-2 which has pneumatically raised rollers.

2014. Pomeranz, J. N. **Automatic wood cutting.** *Sth. Lumberm.* 191 (2392), 1955 (39–40).

Describes an 'automatic intermittent feed-and-cut swing frame wood saw'—a pendulum, circular saw—originally designed for cutting up slabs, but now perfected to allow the automatic cutting of uniform lengths ranging from 3 to 24 in. with an accuracy of $\frac{1}{2}$ in., at the rate of 1080 lengths or pieces/hour.

2015. Balligand, E. Note sur l'usinage des bois à la scie à ruban. **[Sawing wood with band saws.]** *Bull. Inst. agron. Gembloux* 23 (3), 1955 (239–47). E.M.B.

Preliminary results of tests to study energy required and output in sawing Limba [*Terminalia superba*].

2016. Blockbandsägen zum Einschnitt starker Dimensionen. **[Bandsaw mill for logs of large dimensions.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (76). [G.] P.R.

Illustrated description of a large mill manufactured in 3 sizes: for 1000-, 1250- and 1500-mm. wheel diameters; the saw-blades have teeth on either side (patents applied for); the output is claimed to be 4–6 sq. m. of sawn surface per min.

823. Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning

See also Nos. 2001, 2025.

2017. Hipp, K., and Schönborn, H.-H. Trägheitsfreie Schnittkraftmessung beim Holzfräsen. **[Lagless measurement of the cutting force in moulding.]**

Holz Roh- u. Werkstoff 13 (1), 1955 (21–3). [G.g.] P.R.

Describes an apparatus for measuring the cutting force, based on the magneto-striction principle, the potentials induced in a coil round a nickel core being proportional to pressure variations. By electric integration, the potential on the indicating instrument is made proportional to the pressure and hence to the cutting force. The loss of cutting force due to its communication through the wood itself has been reduced to a minimum. The following problems can be successfully tackled by means of this apparatus: (1) evaluation of the maximum force involved in the wear of the tool and in the kick-back behaviour of the wood; (2) fixing the optimum geometry of the cutting edge, and (3) determination of the effect of the cutting speed on the forces developed during cutting, the service life of the tool, and the attainable quality of surface.

2018. ČETVERIKOV, S. S., GRIBOVSKIĬ, P. O., and MIŠKIND, S. I. Derevorežuščiĭ instrument iz keramiki. **[Wood-cutting tool of ceramic material.]** *Derev. Prom.* 4 (3), 1955 (14–5). [Russ.] P.O.

Describes some results obtained when using a ceramic-tipped cutter for planing or moulding hard wood (Oak) or plywood. The depth of cut was 4 mm., the cutting speed 514 m./min. (hand feed). The tests were successful; the nature of the ceramic substance is not given.

2019. JONES, C. W. **Saving lumber through blanking with the two-way thicknessing planer.** *For. Prod. J.* 5 (5), 1955 (329–31).

A new two-way thicknessing planer is described, enabling the sawing to be effected to closer tolerances than in ordinary practice. The merits of blanking (pre-planing) are discussed. *From author's summary.*

2020. LOGAN, H. A., and BRICE, D. C. **Surfacing of the Western Pines and associated woods.** *For. Prod. J.* 5 (5), 1955 (325–8).

Results of a study of the variables in planer operation are presented. The effect of these on surface quality is described, and a guide is provided to improve production and reduce the degrade. *From authors' summary.*

2021. GOODCHILD, R. **The machine boring of wood.** *Bull. For. Prod. Res., Lond.* No. 35, 1955. pp. 19 + 12 photos. Price 2*s.* 6*d.*

Describes tests on the boring of wood under controlled conditions. Power demand depends on the tool shape, feed and spindle speeds, and diameter of bit. Discusses the effect on boring of growth characteristics and grain in various woods and analyses the work done by the various cutting parts of the bit.

824. Forms of Joint. Jointing and Assembly

824.1. Nailed Joints

See also No. 2071.

2022. STOY, W., and MLYNEK, F. Beitrag zur Tragfähigkeit von Holznagelverbindungen bei Verwendung von hochwertigem Stahl und verschiedenen Holzarten. **[Strength of nailed joints using high-quality steel and various timber species.]** *Holz Roh- u. Werkstoff* 12 (10), 1954 (391–402). [G.g.] P.R.

Presents, in the form of graphs and one table, the results of an investigation on the dependence of the strength of nailed joints on two factors: (1) variation in the tensile strength of nails and (2) variation in the strength of timber. Nails of 17 tensile strengths ranging from 34·4 to 185·3 kg./sq. mm. were used. The woods were: Spruce (green), Beech and Oak (both green and dry), Beech plywood, Australian Black-Butt (*Eucalyptus pilularis*) and African Bongossi (*Lophira alata*), their compression strength varying from 300 to 810 kg./sq. cm. The total testing load is distributed between: (*a*) pin-bearing stress ($\perp$); (*b*) pin-holding power and (*c*) friction between wood members plus other effects. It was found that the strength of nailed joints changes very little over a wide range of nail strengths, that (*a*) increases with the strength of steel but depends very little on the strength of wood; (*b*) decreases as the strength of steel increases, and has an optimum value when the ratio of tensile strength of steel to compression strength of wood is ≈ 11; and the value of (*c*) decreases, and even disappears, as the strength of steel increases.

2023. STOY, W., and MLYNEK, F. **Further work on the strength of nailed joints using high-tensile steel and various species of timber.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2677, [1955]. pp. 19. Transl. by J. J. Mack and J. H. Kahsnitz from *Holz Roh- u. Werkstoff* 12 (10), 1954 (391–402). [See preceding abstract.] P.R.

2024. LUXFORD, R. F. **How to avoid nail popping in dry-wall construction.** *Rep. U.S. For. Prod. Lab., Madison* No. 2036, 1955. pp. 5 + 9 photos + 2 dgms. + 2 tbls. P.R.

Tests show that to eliminate the so-called nail 'popping' [springing] one should use framing material at a low moisture content, preferably that which will be attained in service. Threaded nails appear to be helpful.

824.5. Timber Connectors

2025. MASANI, N. J. **Hardwood timber connectors and an improvised machine for making them for rural areas.** *Indian For.* 81 (12), 1955 (774–7 + 6 photos + 12 drawings).

Discusses the function and usefulness of disc-dowels made of hardwood to take the place of metal timber connectors, gives a list of suitable timbers (*Acacia arabica, Grewia tiliaefolia, Xylia xylocarpa, Dalbergia sissoo, Ougeinia dalbergioides, Anogeissus latifolia* and *Pterocarpus macrocarpus*, in that order of preference) with their safe working properties and seasoning properties, and describes a machine designed by the Timber Engineering Bureau, Dehra Dun, for making disc-dowels, and its operation. A specification for wooden disc-dowels is given; an important condition is that they should contain no sapwood.

824.6. Carpenters' and Joiners' Joints

2026. PAVLOV, V. P. **Joining wood longitudinally with toothed tenons.** *Transl. Commonw. sci. industr.*

Res. Organ Aust. No. 2705, 1955. pp. 4 + 2 dgms. Transl. by Casan and N. H. Kloot from *Derev. Iesohim. Prom.* 3 (10), 1954 (5–8). [See *For. Abstr.* 16 (No. 2228).] P.R.

824.8. Glues and Gluing

See also Nos. 1948, 1953, 2062.

2027. HYLER, J. E. **Glues and gluing. Parts 63–73.** *Sth. Lumberm.* 191 (2382–2392), 1955 (35 . . . 40; 47 . . . 50; 35 . . . 38; 43 . . . 46; 39–40; 45 . . . 48; 39 . . . 44; 41–2; 47 . . . 50; 37–8; 55–6).

Hot-press gluing and hot-press charges, faults and testing; knot plugging and patching; bevel scarfing machines; resin-impregnated and densified woods, manufacture and uses.

2028. **Animal glues: their manufacture, testing, and preparation.** *Rep. U.S. For. Prod. Lab., Madison* No. 492 (rev.) 1955. pp. 13. 13 refs. [Cf. *For. Abstr.* 11 (No. 433).] P.R.

2029. PETZ, A., and CHERUBIM, M. Die Bestimmung des freien Formaldehyds bei wässrigen Lösungen von Harnstoffharzen. **[Determination of free formaldehyde in aqueous solutions of urea resins.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (70–5). 16 refs. [G.g.] P.R.

An attempt at developing a titrimetric method of determination of formaldehyde involving its diffusion into an isoamyl-alcohol phase.

2030. ROMANOV, N. T., and GRINŠPUN, S. D. Novyĭ smoljanoĭ kleĭ. **[New resin glue.]** *Derev. Prom.* 4 (7), 1955 (3–5). [Russ.russ.] P.O.

Describes the new Soviet phenol-formaldehyde glue CNIIMOD-1 which polymerizes at 20° C. and contains 2·0–3·0% of free phenol.

2031. WATANABE, H., TAKAKUWA, F., and MIURA, R. **[Studies on foam glue [for gluing plywood].]** *Wood Ind., Tokyo* 10 (2), 1955 (70–5). [Jap.e.] P.R.

2032. JAYNE, B. A. **A non-destructive test of glue-bond quality.** *For. Prod. J.* 5 (5), 1955 (294–301). 16 refs.

Describes a new method for the determination of glue-bond quality by means of vibrational testing. The use of an electrical/acoustical system for exciting, detecting and measuring vibration permits accurate measurement of the resonant characteristics of laminated material. Results of tests with 4 types of defective glue line show that relatively small glue-line defects of types that commonly occur in laminated material can be detected by this method. *From author's summary.*

2033. MARRA, A. A. **A new method for testing wood adhesives. I. The specimen.** *For. Prod. J.* 5 (5), 1955 (301–6). 28 refs.

The merits of the so-called cross-lap specimen are discussed.

2034. YAVORSKY, J. M., CUNNINGHAM, J. H., and HUNDLEY, N. G. **Survey of factors affecting strength tests of glue joints.** *For. Prod. J.* 5 (5), 1955 (306–11). 18 refs.

The objects of strength tests of glue joints and factors affecting the results are discussed. The existence of stress concentrations in conventional test specimens is demonstrated and it is recommended that load at failure should form the criterion of strength rather than stress calculated by dividing the load by the area of the section under test. *From authors' summary.*

2035. NISKANEN, E. Leikkausjännitysten jakautumisesta liimasauman koekappaleessa. **[The distribution of shear stress in the interface of a glued test specimen.]** *Pap. ja Puu* 37 (11), 1955 (529–36). 12 refs. [Fi.e.] [State Institute for Technical Research, Helsinki.] P.R.

Discusses differences in stress (shown in stress diagrams) found between a glued Birch joint and a glued joint of an isotropic material. Results are published in more detail elsewhere. *From author's summary.*

2036. HAIGH, H. W. **A new method for evaluating interior plywood.** *For. Prod. J.* 5 (5), 1955 (285–9). 5 refs.

A modification of the laboratory cyclic M test for interior plywood has been developed, involving the measurement of the actual amount of delamination, using new test specimens. The comparative merits of the new (D) test are discussed.

2037. CARRUTHERS, J. F. S., and HUDSON, R. W. **The durability of plywood adhesives in the tropics.** *Wood* 20 (11), 1955 (424–6). [Forest Products Research Laboratory, Princes Risborough.]

Unpainted Beech and Gaboon (*Aucoumea klaineana*) plywood, variously glued (phenol, resorcinol and melamine resins, fortified and normal urea-formaldehyde) were exposed for 5 years (*a*) to weather, (*b*) under shelter, in England and Nigeria. Failure was judged by a 2-in.-deep separation of the face, and tests for lesser degrade were also made. In Nigeria all glues except the first two named failed in (*a*) or suffered degrade in (*b*), these processes being less rapid in England.

2038. ARNOLDT, W. Verleimung in tropischen Gebieten. **[Gluing in tropical regions.]** *Holztechnik* 35 (9), 1955 (413–4). [G.g.] P.R.

Urea resins are the only glue used in the plywood and chipboard plants of tropical America. Canadian wheat flour is used as extender and has proved excellent. Melamine resin is used as an extender for boat plywood. Results are given of bonding strength tests for different glue mixes.

2039. STUMPFF, G. Untersuchungen über die Furnierfugenverleimung. **[Investigations on the gluing of veneer edge-joints.]** *Holz Roh- u. Werkstoff* 13 (1), 1955 (23–5). [G.g.] P.R.

Describes the results of gluing tests conducted on Beech veneers edge-jointed in the German 'Friz' gluing machine, using 'Pressal K29' adhesive.

2040. ŠTOFKO, J. Dielektrický ohrev dosák z vrstvených valcovaných dýh. **[Dielectric heating of boards from layers of rolled veneers.]** *Dřevo, Praha*

10 (2), 1955 (35–7). [Cz.] From abstr. in *Prehl. lesn. Lit.* 6 (6), 1955 (No. 2298). [Cz.] P.R.

Describes the gluing of rolled densified plies of wood, using an H.F. generator.

2041. Es. Electronik-Mikrowellen-Schnellverleimpress. **[Electronic microwave rapid gluing press.]** *Holz-Zbl.* 81 (129), 1955 (1531). [G.]

The press, intended for the gluing of frame corner joints, uses micro-waves of 12·4 cm. generated by water-cooled, all-metal magnetrons of high capacity. The 4 radiation units of ca. 1 KW capacity are movable in all directions. Total power consumption is 10 KVA.

825. Cleaving. Adzing. Mechanical Comminution

See No. 2080.

826. Peeling. Slicing. Trimming, Edging etc. of Thin Sheets

2042. ŠVARCMAN, G. M. O podgotovke luščiljnyh nožeĭ k rabote. **[Preparation of peeler knives for work.]** *Derev. Prom.* 4 (7), 1955 (11–4). [Russ.] P.O.

Discusses the effects of wear (i.e. loss of flatness and shape in the bevel) in peeling knives, and gives a graph showing the relationship between its amount and the lowering of veneer compression for different veneer thicknesses (e.g. an indentation of 0·15 mm. causes in veneer 1·5 mm. thick a 10% loss of compression during peeling). Any such wear on either side of the knife blade causes an increase of the height difference between the pressure-bar edge and the knife-edge, thus worsening the distribution of pressure. It is recommended that not only the bevel, but also the flat face of the knife, should be sharpened. The design and operation for this purpose of grinding cylinders, consisting of 4-6-8 Alundum-in-bakelite segments held in a special housing, is discussed.

2043. PECHER, E. Die Rotationsmessermaschine in der modernen Kistenfabrikation. **[The use of rotary slicers in modern packing-case manufacture.]** *Holz-Zbl.* 81 (124), 1955 (1471–2). [G.]

By substituting for a saw a machine equipped with 2 knives of 42–151 cm. working length, fitted to a vertical disk rotating at 60–110 revs./min., on timber (round or sawn) which has been softened by cooling or steaming, much time and material (by eliminating kerf) can be saved in the manufacture of thin boards for packing cases. Thicknesses can be varied from 16 to 1 mm. for Spruce or Fir, and down to 0·5 mm. for Beech or Ash. The machine can also be used for door panels and tapered roof shingles.

827. Bending. Moulding (other than by Cutting)

2044. PECK, E. C. **Bending solid wood to form.** *Rep. U.S. For. Prod. Lab., Madison* No. 1764 (rev.) 1955. pp. 32 + 23 photos + 4 dgms. + 4 tbls. 4 refs. P.R.

Cf. *For. Abstr.* 12 (No. 3128).

829.1. Finishing

See also No. 2183.

2045. GNANT, J. Verfahren zum Bleichen von organischen Produkten, wie von Holz, Leder, Schwämmen und Federn. **[Method of bleaching organic products such as wood, leather, sponges and feathers.]** *Swiss Patent* No. 299,803, Sept. 1, 1954. pp. 1 [G.] P.O.

Uses an aqueous solution of a solid preparation of H_2O_2 with carbamide (urea).

2046. WEBER, G. Bleichen von Holz mit Wasserstoffsuperoxyd und Zusatzpaste. **[Bleaching of wood by means of hydrogen peroxide and a supplementary paste.]** *German Patent* No. 889,220, Sept. 7, 1953. pp. 2. [G.] P.O.

The supplementary paste applied in mixture with H_2O_2 (15%) consists of waterglass, anhydrous Na_2CO_3 and oxalic acid. After one or more applications the wood is washed thoroughly with water.

2047. MELL VON MELLENHEIM, J. Verfahren zur Herstellung eines Mittels zum Beizen von Nadelholz. **[Method of preparing a medium for staining coniferous wood.]** *German Patent* No. 900,013, Dec. 17, 1953. pp. 2. [G.] P.O.

Aqueous dispersions of synthetic resins, free from solvents, containing plasticizers and emulsifiers, are mixed with metallic salts used for staining (e.g. alkali chromates and $CuCl_2$).

2048. IVANOV, P. A. **[Deep staining of Beech veneers.]** *Derev. lesohim. Prom.* 3 (6), 1954 (23–5). [Russ.] From *abstr.* in *Chem. Zbl.* 126 (12), 1955 (2805). [G.] L.S.

Gives various recipes for acid aniline dyes. One process, conducted at 100° C., lasts 4 hours.

2049. RÖSSLER, R., and SCHOLLES, W. (to Deutsche Solvay-Werke G.m.b.H.). Braunfärbendes, holzschützendes Anstrichmittel. **[A brown-staining, wood-protecting coating.]** *German Patent* No. 893,119, Oct. 12, 1953. pp. 2. [G.] P.O.

The substance contains lignite chemically degraded by means of alkalis, fluoride solutions, Na_2CO_3 or other similar salts, plus metal salts (Fe, Zn, Cr, Al, etc.) or their complexes.

2050. HYLER, J. E. **Drum sanding wood products.** *For. Prod. J.* 5 (5), 1955 (336).

Modern drum sanders, their operation and merits are described.

2051. BARNEBEY, H. L. **The Chem-Dry process—a rapid method for hardening inks and coatings.** *For. Prod. J.* 5 (5), 1955 (382–4).

Describes a process in which coated materials are passed through a chamber containing SCl_2; the finish hardens in a few seconds or minutes. The merits of the method are discussed.

83. Timber Manufacturing Industries and Products. Uses of Wood as Such

831. Fuelwood and Various Types of Rough Timber

See also Nos. 2087, 2094, 2108, 2112–3, 2115–9, 2135, 2143.

2052. KOHLER, K. Über die Berechnung von Holztragmasten von Freileitungen. **[Design of wooden poles for overhead lines.]** *Elektrizitätswirtschaft, Frankfurt am Main* 53 (24), 1954 (807–9). 2 refs. [G.g.] P.O.

Derives formulae and nomograms for the dimensions of wooden poles, given the values of tensile and bending stress.

2053. **Committee D-7 on wood. ASTM wood pole research program. Progress report No. 3.** *Bull. Amer. Soc. Test. Mat.* No. 208, 1955 (25). P.R.

Describes the principles of identification and selection of poles for the strength tests. So far 7000 tests of small specimens (moisture content, density, bending and compression strength, stiffness, toughness and hardness), have been made on material from 316 poles of 'Southern' Pine, *Larix occidentalis, Pseudotsuga taxifolia, Thuja plicata*, and *Pinus contorta*.

2054. SPAETH, J. N., and MEEK, W. L. **Report on durability of Bald Cypress posts.** *For. Note Ill. agric. Exp. Sta.* No. 57, 1955. pp. 1.

Untreated posts of *Taxodium distichum* examined after 18 years' service in rich prairie soil, were still serviceable, but showed varying amounts of decay, and it is suggested that locally-grown posts of non-durable species, if suitably treated, would last as long at a lower cost.

2055. WEGELT, W. Holzschwellen in Deutschland. **[Wooden sleepers in Germany.]** *Int. Holzmarkt* 1955 (14), (22–6). [G.]

Species, minimum quality requirements, pressure treatment, manufacture and installation, and performance.

832. Mills, Their Functions and Products

832.1. Sawmills and Planing Mills

See also Nos. 1622, 2011 *et seq.*, 2189–91.

2056. THUNELL, B. **Sawmilling in Sweden.** *Unasylva* 9 (3), 1955 (103–10).

Discusses frame-saw mills, circular-saw mills, consumption of raw material and comparison of costs between different types of mill.

2057. THOMAS, D. P. **New developments in milling of small softwoods.** *For. Prod. J.* 5 (5), 1955 (322–4).

Describes the use (in western U.S. milling practice) of gang-saws and bandsaws for headrigs, and the automation of small-log mills.

2058. **Log splitters solve the oversize problem.** *Timberman* 57 (1), 1955 (78–9).

Describes saw equipment used at mills in Oregon and Washington for splitting logs larger than headrig capacity, in the log pond.

2059. MIYOSHI, T., and TACHIBANA, Y. **[Studies on working intensities [energy consumption] in wood sawing [from the standpoint of industrial fatigue and efficiency].]** *Wood Ind., Tokyo* 10 (6), 1955 (266–70). 3 refs. [Jap.e.] P.R.

Factors studied were saw-bench height, circular or band sawing (the former more energy-consuming), species (three, including Pine) and wood density.

2060. COLLETT, R. G. **Utilisation of small diameter trees.** *N.Z. Timb. J.* 2 (2), 1955 (23–4).

Gives tables of % conversion by grades in frame and circular sawing of 5- to 15-in.-diameter Tawa [*Beilschmiedia tawa*], Matai [*Podocarpus spicatus*] and Rimu [*Dacrydium cupressinum*], indicating the financial advantage of frame-sawing the first two species. Conversion data are also given for frame-sawing Silver Beech [*Nothofagus menziesii*].

2061. SALO, E. Sahateollisuuden jätepuun käyttö Suomessa vv. 1927–50. **[The Finnish sawmill industry's utilization of waste wood, 1927–1950.]** *Commun. Inst. for. Fenn.* 43 (3), 1954 (1955). pp. 23. 16 refs. [Fi.e.]

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 1948, 1958, 1963–4, 2027 *et seq.*, 2042, 2122–6.

2062. LATHAM, J. F., and PALMER, P. W. **Plywood: a short guide to manufacture, glues and grading.** James Latham Ltd., London. 1955. pp. 12.

Includes tabulated notes on the principal plywood species, under the heads of colour, producing countries, main sizes, thicknesses, grades, glue, availability and suitability.

2063. **A survey of the Australian plywood industry.** Commonwealth Forestry and Timber Bureau, Canberra. 1955. pp. 22.

Describes the structure of the industry, timbers used, veneer production, plywood production, production trends, imports and exports, and plywood consumption per capita.

2064. GOTTSTEIN, J. W., and CULLITY, D. M. **A new type screened dryer for rotary peeled veneers.** *For. Prod. J.* 5 (5), 1955 (289–94). 12 refs.

Describes a new compartment-type cross-circulation drier which incorporates a combined screen and straightener. Its applicability to Australian and American conditions is discussed.

2065. BATEY, T. E., JR. **Minimizing face checking of plywood.** *For. Prod. J.* 5 (5), 1955 (277–85). 13 refs.

The results of tests concluded so far by the Douglas Fir Plywood Association show that significant factors in veneer face checking are: type of grain, quality of peeling, moisture content of veneer at time of pressing, and water-repellent treatment of finished plywood panels. It may be possible to reduce face checking by controlling these factors.

2066. Die Platte—ein Holzwerkstoff. **[Panels—a wood material.]** *Holzwirtschaftliches Jahrbuch,*

Stuttgart No. 4, [1955?]. pp. 223 + 2 maps. [G.] P.R.

Comprises the following articles: (1) Manufacture of sawn, sliced and peeled veneer (*M.-A. André*); (2) Veneer as an element of plywood (*W. Weinhold*); (3) Plywood from peeled veneer (*E. Plath*); (4) Plywood uses (*C. Blankenstein*); (5) Core boards, their structure, properties and uses (*G. Hetterich*); Chipboard, its development and manufacture (*W. Klauditz*); (7) Compound panels (*F. Kollmann*); (8) Fibreboard, its importance and manufacture (*H. Neusser*), and (9) Uses of fibreboards (*H. Vaget*). The book has a separate advertisement section (100 pages) with an index.

2067. Rakin, A. G. Polye ščity s zapolnitelem iz gofrirovannogo špona. [**Hollow panels with corrugated-veneer filling.**] *Derev. Prom.* 4 (8), 1955 (9–13). [Russ.] P.O.

Describes a new hollow panel-core consisting of a frame filled with corrugated veneer. The manufacture and properties of the panels obtained are described.

2068. Dosker, C. D. (to Gamble Brothers, Inc.). **Method of processing wood.** *U.S. Patent* No. 2,653,890, Sept. 29, 1953. pp. 3. 5 refs. P.O.

Rough-surfaced unplaned boards are first indented with many shallow and narrow openings, applying to each surface a glue which causes the loosened pores to swell, and gluing the boards to form laminates in the usual way.

833. Timber in Buildings and Engineering Structures (Manufacture and Use)

833.1. Building Components and Fittings: General

See also No. 2024.

2069. Wille, F. Betrachtungen zu neueren Holzkonstruktionen. [**New wooden constructions.**] *Holz Roh- u. Werkstoff* 13 (1), 1955 (25–32). [G.g.] P.R.

Discusses the present position and possibilities of wooden construction with special reference to Germany.

2070. Johnson, J. W. **Lateral tests on 12- by 60-foot and 20- by 80-foot lumber-sheathed roof diaphragms.** *Rep. Ore. For. Prod. Lab.* No. *T*-12, 1955. pp. 11 + 21 photos., 3 gphs., 5 tbls.

[Cf. *For. Abstr.* 16 (No. 4623).] Data from tests of a 12- by-60-ft. and a 20- by-80-ft. lumber-sheathed roof diaphragm were combined with results of tests made on four diaphragms in 1954. One of the aims of the tests was to evaluate the strength and stiffness under lateral loads in diagonally sheathed diaphragms of like construction but of different length/width ratios. Another aim was to compare the results of tests made on two similar 12-by-60-ft. specimens; these were found to react almost identically under the same load. Relationships between shear loads and maximum shear loads for diaphragms with various length/width ratios are tabulated. *From author's summary.*

2071. Radcliffe, B. M., and Suddarth, S. K. **The Purdue-Illinois nail-glued roof truss with a pitch of 2:12 for spans of 24 feet 8 inches and 28 feet 8 inches.** *Sta. Bull. Ind. agric. Exp. Sta.* No. 621, 1955. pp. 18. 4 refs.

Describes the experimental methods used to develop the design and gives building specifications (including glue type and spread, nail size and spacing) for the truss, with illustrations. The glued gusset plates used greatly increase its stiffness. It is clear span, and no interior load-bearing walls are needed. Full-size trusses tested to destruction showed loads at failure many times greater than the design load; results of these tests will be published later. The nails do not add to the strength of the joints but provide the necessary pressure during glue curing (about 24 hours).

2072. Roscoe-Hudson, A. **Wood floors. Types and substructures.** *Wood* 20 (11), 1955 (446–9).

Lists the types of floors and substructures for joist, solid, sound-absorbent, thermal-insulated sprung and heavy-duty floors for ground and upper storeys and gives the qualities (6 ratings) in appearance, ease of cleaning, quietness, non-slip character, impact and wear resistance and warmth for hardwoods and softwoods used as end-grain blocks, blocks, boards, strips, parquet, plywood etc.

2073. Va. Die Ge-Be-Bau-Gleitdielen. ['**Ge-Be-Bau' sliding floorboards [in houses].**] *Holz-Zbl.* 81 (145), 1955 (1719). [G.]

The boards, provided with transverse grooves, slide on [wooden?] rails fixed on the joists and, having glued tongued-and-grooved joints, move as one piece. A gap for lateral swelling is left along the walls, and covered by a wide skirting board.

833.3. Special Uses in Factories and Workplaces

See No. 2095.

833.4. Special Uses in Agricultural Structures

See Nos. 2120–1.

834. Shingles. Cooperage. Packing Containers. (Manufacture and Use)

See No. 2043.

835. Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.

See also Nos. 2173, 2178.

2074. Harada, M., and Soga, M. [**Cork-like wooden stoppers.**] *Japanese Patent* No. 93 ('53), Jan. 9, 1953. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (2), 1954 (913a). P.R.

Stoppers cut from coniferous woods are immersed for 15 hours in a solution of 4 parts by weight of $Ca(NO_3)_2$, 4–6 parts of water and 6 parts of HNO_3; they are then washed with water, then with 35% NH_4OH, again immersed for 10 hours in a solution of $Ca(NO_3)_2$, and finally in a rubber or resin solution. They are then dried.

2075. IMBSWEILER, K. Die maschinelle Fertigung von Bürstenhölzern. **[Machine manufacture of brush heads.]** *Holz Roh- u. Werkstoff* 12 (6), 1954 (242–5). [G.g.] P.R.

Describes the various stages of manufacture and the machines, of German make, used.

836. Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments

See also No. 2223.

2076. ILJINSKIĬ, S. A., OTLIVANČIK, A. N., BLEHMAN, A. B., and MALJCEVA, V. P. Normativy dopuskov i posadok v soedinenijah detaleĭ i uzlov mebeli. **[Standards of tolerances and shrinkage in the joints of furniture details and elements.]** *Derev. Prom.* 4 (2), 1955 (8–12). [Russ.] P.O.

Based on the Soviet standard GOST 6449–53.

838. Vehicles (including Ships, Boats, Aircraft)

2077. STUMPP, T. Werkstättenholz und dessen Trocknung. Probleme und Erfahrungen der Deutschen Bundesbahn. **[Workshop timber and its seasoning. Problems and experiences of the German Federal Railways.]** *Holz-Zbl.* 82 (1), 1956 (1–3). [G.]

In addition to problems of seasoning both softwoods and hardwoods, the article deals with the use of various boards for closed goods wagons, and the use of imported and improved woods for the flooring of open goods wagons. In a 3-year practical test, Pine impregnated with synthetic resin was less hard-wearing than natural Oak and Beech impregnated with oil.

839.2 Wood Flour and its Manufacture

2078. ARHANGELJSKIĬ, V. D. Tehnologičeskiĭ process proizvodstva drevesnoĭ muki. **[Technology of wood-flour manufacture.]** *Lesn. Prom.* 14 (1), 1954 (23–4). [Russ.russ.] L.S.

Discusses the suitability of different technological methods (single *vs.* multiple grinding, closed-cycle operation, etc.) for wood flour of different degrees of fineness and for plants of different size.

839.8. Industrial Waste Wood, its Processing and Uses

See also Nos. 1499–1500, 2061, 2198, 2229, 2231, 2234, 2243.

2079. SMITH, W. R., ENGLERTH, G. H., and TARAS, M. A. **Wood residue in North Carolina—raw material for industry.** *Resource-Industry Series, North Carolina Department of Conservation and Development, Raleigh, N.C.* No. 8, 1955. pp. 59. 63 refs.

Results of a survey of wood waste in North Carolina woodworking industries, sawmills, plywood mills etc., with suggestions for its utilization.

2080. JACOBSON, G. **New developments in mechanical equipment for sawmill waste utilization.** *For. Prod. J.* 5 (5), 1955 (35*A*–38*A*).

Illustrated descriptions of 4 barkers and 1 chipper.

2081. TODD, A. S. **How much wood in a cord of Pine slabs?** *Res. Note Stheast. For. Exp. Sta.* No. 87, 1955. pp. 1.

A table giving approximate volumes of bark-free wood per cord of 128 cu. ft., by log diameter and species (Longleaf and Shortleaf, Loblolly, and Slash Pine). The average is 50 cu. ft. wood, and 79 cu. ft. wood and bark.

2082. SKJELMERUD, H. Fastmasse i bakhon. **[Solid volume in [stacked] slabs and edgings.]** *Norsk Skogind.* 9 (11), 1955 (446–53). 7 refs. [Nor.e.] P.R.

Presents the results of studies on stacked slabs and edgings from a number of sawmills. Measurements of solid volume were made by water displacement. Solid-wood volume of the normal combination of slabs and edgings ranged from 50 to 65%, and the number of pieces per *favn* ['cord'—dimensions not specified] from about 1000 to 4000, according to size of timber handled at the mill, degree of sorting before sawing etc. Variations in solid volume depended on care in stacking, number of pieces per *favn*, length of slabs etc. A graph of the relationship between solid volume and number of pieces per *favn* shows a very wide variation in solid volume for the same number of pieces, but a tendency to decreasing solid volume with increasing number of pieces.

2083. VA. Die neue Brikettiermaschine 'Compress'. **[The new 'Compress' briquette press.]** *Holz-Zbl.* 81 (132/133), 1955 (1563). [G.]

The machine compresses sawmill waste to ovoids of 35–45 mm. diameter weighing ca. 30–45 g. each. No binder is used. Volume is reduced to $\frac{1}{6}$th, and cal./kg. about doubled. The waste must be at least air-dry. The machine uses 6 KWH.

2084. **The Glomera briquettor.** *For. Equipm. Note, FAO* No. *D.*5.55, 1955. pp. 2.

Describes an apparatus (manufactured by Pawert Ltd., Basel) for high-pressure briquetting without a binder, using not only wood waste, sawdust, and bark, but also peat, lignite, coal, cotton stalks, sugarcane bagasse etc.

2085. ŠEREMETJEV, V. S. Lokomobiljnye topki skorostnogo gorenija, rabotajuščie na lesosečnyh othodah. **[Mobile [power-generating] furnace units for rapid burning of logging waste.]** *Lesn. Prom.* 14 (11), 1954 (15–7). 1 ref. [Russ.] L.S.

Illustrated description of boiler furnaces of the type previously described [see *For. Abstr.* 16 (No. 1051)], modified and adapted to the new 'GRAMA-6' power-generating units. Their performance with firewood of 50–52% moisture content is tabulated in detail.

2086. SHEREMET'EV [ŠEREMETJEV], V. S. **Mobile power-generating units using an accelerated method of burning logging waste [in use at a logging camp].** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2636, [1955?] pp. 5 + 2 dgms. Transl. by M. Slade from *Lesn. Prom.* 14 (11), 1954 (15–7). Limited distribution. [See preceding abstract.]

84. Preservation and Other Treatments to Improve the Properties of Wood. Damage by Biological Agencies and its Control. Seasoning. Timberyard Practice

841. Wood Preservation

See also Nos. 2055, 2135–6, 2175.

2087. **General conditions and prerequisites for impregnation of timber.** *Svenska Elverksföreningens Handlingar* [*Stockholm*] 1955 (5). pp. 18. [Sw.] From *abstr.* in *Elect. Engng. Abstr.* 58 (695), 1955 (No. 4668). D.S.I.R.

Regulations issued by the Swedish committee on protective impregnation of timber for transmission poles, railway sleepers, piles, and structural work (mainly Pine), include requirements for timber quality, moisture content and shape. The timber should be felled in winter and air dried. The procedures for partial and full impregnation are described in detail and data on composition of the various oil and salt impregnants are given.

2088. WALTERS, C. S. **Processing test data by the IBM system.** *For. Prod. J.* 5 (5), 1955 (364–8).

Develops a plan for recording and processing the data obtained in a preservative study in which small stakes were used, by means of the International Business Machines Corporation's (IBM) equipment. The methods involved can be also used in other investigations on wood products.

2089. HAIKONEN, M. **On the toxicity to domestic animals of impregnated wood.** *Transl. N.Z. For. Serv.* [1955]. pp. 8. 24 refs. Transl. from *Nordisk Veterinærmedicin, København* 6, 1954 (533–46). [See *For. Abstr.* 16 (No. 1060).]

2090. ZUBIETA, G. J. Valoración tóxica comparativa de algunos preservadores de maderas. **[Evaluation of the comparative toxicity of some wood preservatives.]** *Industria y Química, Buenos Aires* 16 (5), 1954 (305–6). [Span.] L.S.

[Cf. *For. Abstr.* 16 (No. 1064).] A revised and expanded bibliography to the study, containing 111 references.

2091. BERNARDI, A. E. Determinación de la retención de creosota en madera preservada. **[Determination of the retention of creosote in treated wood.]** *Repr.* from *Industria y Química, Buenos Aires* 17 (3), 1955. pp. 4. 34 refs. [Span.] P.R.

Kiln-dried specimens were impregnated with 50% creosote in toluene, under vacuum for 5 min., and were allowed to stand on filter paper for 2–5 days until the solvent had evaporated and the excess creosote drained off. The retention of creosote was then evaluated by weighing. The water content of the specimens was next determined through extraction with toluene by the method of Dean and Stark. Finally the specimen was cut into chips and the creosote extracted by benzene in a Soxhlet apparatus. The amount of creosote estimated by the last process was considered to be the net creosote retention of the specimen. The results are presented of tests on 3 commercial specimens.

2092. WILSON, S. J., TAMBLYN, N., and MCCARTHY, D. F. **Project P.9. Properties of wood preservatives. Sub-project P. 9–6. The toxicity and permanence of water-borne preservatives. Progress report No. 1. The resistance to leaching in distilled water of some waterborne preservatives in blocks of *Eucalyptus regnans* sapwood.** Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 20 + [i] + xx + 3 dgms. + 4 gphs. 7 refs. Limited circulation. P.R.

The results of investigations of leaching periods of ca. 128 days are tabulated, and curves are constructed showing the rate of leaching of the main toxic radicals in 14 water-borne preservatives.

2093. COSTA, E. W. B. DA. **Project P.9—Properties of wood preservatives. Sub-project P.9–6. The toxicity and permanence of water-borne preservatives. Progress report No. 2. The decay resistance of preservative-treated *Eucalyptus regnans* sapwood after intensive leaching with distilled water.** Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 15. 10 refs. Limited distribution. P.R.

Tabulates the results of tests with 18 preservative treatments (14 different preservatives) on $2 \times 1 \times \frac{1}{2}$-in. blocks, using the fungi *Coniophora cerebella*, *Poria monticola* and *Trametes cinnabarina*.

2094. HERZIG, J. Vergleichende Auslaugversuche an Holzproben aus salzgetränkten Fichtenmastabschnitten. **[Comparative leaching experiments with wood specimens taken from Spruce pole sections impregnated with salts.]** *Holz Roh- u. Werkstoff* 13 (1), 1955 (1–5). 11 refs. [G.g.] P.R.

The resistance to leaching of 6 commercial inorganic wood preservatives officially approved in Germany, was tested on disks taken from impregnated Spruce poles and having either exposed or covered end-grain surfaces. Three preservatives (FEU, UA and HUZ) were found to fix well shortly after impregnation, whereas the other three (FES, U and HUX) took considerably longer. FEU and HUZ are recommended for structures in damp mines and for damp dwelling houses; FES, U and HUX only in situations where leaching is impossible. The sampling method used gives more reliable results for behaviour *in situ* than the DIN method using standard blocks. The efficiency of FEU and FES after leaching was tested and confirmed by tests against fungi.

2095. **New timber preservative.** *Timb. Tr. J.* 215 (4129), 1955 (77–8, 83).

Gives an account of the research into the causes of soft rot of wood in cooling towers [cf. *For. Abstr.* 14 (Nos. 1598–9)] and in transmission poles in Rhodesia, which led to the discovery that *Chaetomium globosum* was a timber-destroying fungus, acting in conditions of wetness and heat that leached out other preservatives such as Tanalith 'U'. Hickson's Timber Impregnating Co. of Castleford, Yorks. have now evolved a preservative, Tanalith 'C', with an all-round toxicity even after extended washing in running water at high temperatures.

2096. COMPAGNIE DE PRODUITS CHIMIQUES ET ÉLECTROMÉTALLURGIQUES PECHINEY, and PROGIL.

Procédé d'imprégnation des bois. **[Method of wood impregnation.]** *French Patent* No. 1,053,273, Feb. 1, 1954. pp. 2. [F.] P.O.

With NH_4 salts of tri- and/or tetrachlorophenol in aqueous solution by the Boucherie or Bethell process.

2097. DEUTSCHE SOLVAY-WERKE G.M.B.H. Puunsuoja-aine. **[Wood preservative.]** *Finnish Patent* No. 27019, May 10, 1954. pp. 2. [Fi.sw.] P.O.

The preservative contains up to 20 parts by weight of PCP, up to 50 parts of alkali fluoride (mostly NaF), up to 35 parts of K_2CrO_4, and such a proportion of buffer salts as to bring the pH of the 4–6% aqueous solution to > 7, preferably 7·5–8·5.

2098. WALTERS, C. S. **A comparison of two methods of measuring pentachlorophenol penetration.** *For. Note Ill. agric. Exp. Sta.* No. 59, 1955. pp. 2. 1 ref.

Analysis of test results tends to confirm the claim that the methyl-violet test method [cf. *For. Abstr.* 13 (No. 2541)] facilitates the measurement of penetration when light-coloured oils are used as solvents.

2099. HATFIELD, I., and SAKORNBUT, S. S. **Relationship of oil carriers to utility of pentachlorophenol as a wood preservative.** *For. Prod. J.* 5 (5), 1955 (361–4).

PCP wood-preserving formulations are classified into 4 basic types. Information is given on the constituents of the formulations for each type, their application to wood, characteristics and basic end-uses. *From authors' summary.*

2100. KELSO, W. C., JR., BEHR, E. A., and HILL, R. E., JR. **Pentachlorophenol gradients in pressure-treated wood under exposure to weather.** *For. Prod. J.* 5 (5), 1955 (369–77). 2 refs.

During impregnation by the empty-cell process of Douglas-Fir lumber and dimension stock with PCP in a wide range of solvents, some loss of preservative can be expected. With the usual gas-oil solvent, the loss is mainly caused by exudation shortly after treatment; the net loss after the first 12 months was found not to exceed 25%. No loss of PCP or exudation of preservative was found with pressure-treated Southern Yellow Pine 2 × 4 in. × 8 ft., with aromatic gas-oil as solvent, in the first 12 months after treatment. With aromatic kerosene as solvent, however, a considerable loss of PCP occurred. In one case, the proportion of solvent deep in the wood (the second inch from surface) substantially decreased, without causing loss of PCP.

2101. SCHULENBURG, W. (to Deutsche Gold- und Silberscheideanstalt). Verfahren zum Schützen von Holz, Textilien u. dgl. gegen Pilzbefall, Bewuchs und Schädlinge. **[Method of protecting wood, textiles or the like against attack by fungi, etc. and pests.]** *German Patent* No. 918,409, Sept. 27, 1954. pp. 2. 4 refs. [G.] P.O.

The material is impregnated with a $Zn(CNS)_2$ solution and, with or without drying, treated with formaldehyde vapours.

2102. SCHULZE, B. Holzschutzmittel gegen tierische und pflanzliche Zerstörer oder zu ihrer Bekämpfung in bereits befallenem Holz. **[Wood preservative for prevention and control of animal and plant pests in timber.]** *German Patent* No. 915,863, July 29, 1954. pp. 2. [G.] P.O.

An aqueous solution, or paste, containing a mixture of KHF_2 and NH_4HF_2, particularly in a 4/1 ratio. Suitable for *Hylotrupes bajulus* control.

2103. DAIMLER, K., and LORENZ, V. (to Farbwerke Hoechst A.-G. vormal Meister Lucius and Brüning). Holzschutz-Osmotierpasten.] **Wood-preserving pastes with osmotic effect.]** *German Patent* No. 909,150, April 15, 1954. pp. 2. [G.] P.O.

The pastes contain finely comminuted free β-naphthol and easily diffusing substances, e.g. sulphamates, iminodisulphonates, or salts containing sulphamide.

2104. DAVIS, W. K. **Toxic coating composition and method of applying said composition to wood.** *U.S. Patent* No. 2,708,640, May 17, 1955. pp. 2. 9 refs. P.O.

Example of a fungicidal and insecticidal emulsion: water 2·5 gal.; 5% solution of PCP in kerosene 26 gal.; triethanolamine 3, and oleic acid 12·5 pints. The emulsion is applied as a paste up to 1 in. thick.

2105. DOW CHEMICAL CO. **Wood preservative composition and a method of preserving wood.** *British Patent* No. 710,566, June 16, 1954. pp. 3. P.O.

The composition comprising a finely divided SiO_2 aerogel with at least 4% of PCP, and an oil, is applied to timber at about the ground line.

2106. CHIYODA, S., and HIJIKURO, T. **Agent for combating termites and wood-decaying molds.** *Japanese Patent* No. 4950/54, Aug. 9, 1954. [Jap.] From *abstr.* in *Chem. Abstr.* 49 (19), 1955 (13582). P.R.

A mixture prepared from an extract of leaves and stems of *Houttuynia cordata*, *o*-dichlorobenzene, PCP, DDT, creosote oil, Pine root oil, and paraffin oil.

2107. RAVAY, P. Appareil pour introduire un liquide d'imprégnation dans une bille de bois. **[Apparatus for introducing impregnating liquids into a wooden log.]** *Swiss Patent* No. 298,218, July 1, 1954. pp. 3 + 3 dgms. [F.] P.O.

An injection device, the piston being actuated when the device is pressed against the log.

2108. **[The value of incising for creosote treatment of wooden products.]** *Wood Ind., Tokyo* 10 (4), 1955 (175–6). 8 refs. [Jap.e.] P.R.

Incision of Nara [*Quercus* sp.] sleepers does not of itself much improve penetration, but if followed by air-seasoning and creosoting improves both penetration and distribution of creosote. Incision of Nara sleepers and *Cryptomeria japonica* poles followed by boiling under vacuum has a similar effect. Complete protection of sapwood of *C. japonica* poles can be obtained by this method. *From author's summary.*

2109. RÜTGERSWERKE A.-G. **Procédé pour imprégner le bois de hêtre. [Method of impregnating Beech wood.]** *French Patent* No. 1,064,227, May 12, 1954. pp. 2. [F.] P.O.

Beech wood of 40–90% moisture content is subjected for several hours to impregnation at ca. 100° C. without pressure, prior to ordinary pressure treatment.

2110. HENRIKSSON, S. T. **Impregnation of wood by the alternating pressure method.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2717, [1955]. pp. 23 + 4 dgms. 17 refs. Transl. by M. Slade from *Holz Roh- u. Werkstoff* 12 (6), 1954 (233–41). [See *For. Abstr.* 16 (No. 1083).]

2111. RENNERFELT, E. **Rotting tests with wood impregnated by the alternating pressure method.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2716, [1955?]. pp. 10 + 1 photo. 5 refs. Transl. by M. Slade from *Holz Roh- u. Werkstoff* 12 (7), 1954 (267–70). [See *For. Abstr.* 16 (No. 2319).]

2112. **A new vacuum treatment for wood preservation.** *Timber of Canada* 16 (3), 1955 (17–20).

Illustrated account of a mine's installation, unique in using the Dri-Vac process with chromated $ZnCl_2$. The operation and the cycle times are detailed, the latter totalling 52 minutes for Pines and 62 for Fir. [Cf. *For. Abstr.* 10 (No. 1269).]

2113. LEBACQ, L. L'utilisation des traverses de chemin de fer en bois du Congo belge et leur préservation. **[Utilization and preservation of Belgian Congo railway sleepers.]** *Bull. agric. Congo belge* 46 (5), 1955 (1017–64). [F.flem.]

An anatomical study of 22 species was made, both for identity and in connexion with their impregnation. Sleepers from the same logs of each of these species were treated (*a*) with 1% As [unspecified] at 100° C. for 48 hours, (*b*) with 10% improved salts at 50% for 8 hours, (*c*) with the same, cold, for 8 hours, and (*d*) with the same, cold, for ½ hour by the Lebacq process. The improved salts were a mixture of Na arsenate, NaF, $Na_2Cr_2O_7$ and dinitrophenol. Tables group the species on their mechanical properties and on ease of impregnation. The weights of preservative absorbed per cu.m. and per sleeper are also tabulated. The Lebacq process gave the greatest absorption, as the heartwood also is penetrated. Sections buried for 12 months were unearthed completely unaltered, and 3 years' service promises well for the process. The cost of preservation was ca. Fr. 12·50/sleeper. On the basis of the study, the sleepers are classified as: first-quality—*Scorodophloeus zenkeri, Parinari glabra, Blighia welwitschii,* and *Autranella congolensis,* the last earning its place exclusively on its natural durability; good quality—*Gilbertiodendron grandistipulatum, G. dewevrei, Guarea cedrata, Ongokea gore*; medium quality—*Macrolobium* spp. (2), *Gilbertiodendron grandiflorum, Chrysophyllum africanum, Tessmannia anomala, Baphia laurentii,* and *Cynometra alexandri.* Six species rejected include *Tessmannia, Uapaca, Oxystigma* and *Guibourtia* spp. Photomicrographs (× 76) illustrate the anatomy of a representative of each of these classes. The 'hot-to-cold' processes [(*a*) and (*b*) above] are rejected as leading to superficial impregnation only. Heat sets up an internal barrier by the coagulation and precipitation of sap. Arsenic, which is dissolved with KOH, also leads to loss of cohesion in the tissue elements. Success in its use in S. Africa [with *Baikiaea*?] is illusory, the species treated being extremely durable without treatment. The reduction of temperature to 50° C. in (*b*) cut out some of the objections of the higher temperature process. The superficial impregnation obtained is suitable for medium-quality checked and split sleepers. Treatment (*c*), though better than (*a*) has no advantage over (*b*). The experimental development of the Lebacq process used in (*d*) is explained in detail and the lay-out of an industrial-scale installation shown in a plan. One is now in operation by the CFL railways near Stanleyville. The process depends on drawing in the preservative by suction at one end of the sleeper, through the vessels of both heart- and sapwood. When the vacuum is released, the preservative spreads through the pores of the vessel walls into the surrounding tissues. The equipment (illustrated) includes 2 vacuum pumps drawing air through a non-returnable valve from a vacuum reservoir of 1000 litres capacity, provided with a drainage outlet. This reservoir is connected, by a horizontal pipe fitted with hoses and suction attachments which are sealed, to the dry transverse ends of sleepers standing erect and almost immersed in the preservative. The monthly output with 10 such attachments for an 8-hour daily shift is 3840 sleepers, a crew of 6 men being sufficient. Additional points emphasized are: that best results are got if sleepers are treated within a fortnight of felling (or sawing); sleepers should be quarter-sawn; to maintain a 10% solution of the improved salts 110 kg./1000 litres of the local water are used to precipitate out Fe and Al salts. Only the decanted liquid is used; woods with rays surrounded by parenchyma should be preferred.

2114. SII, S. **[On the penetration of preservatives into wood by means of the hot-and-cold-bath process.]** *Wood Ind., Tokyo* 10 (9), 1955 (450–5). [Jap.e.] P.R.

Penetration through all surfaces, especially the end surface, will take place when wood is dipped in boiling Na pentachlorophenate solution or is heated for a moderate time in creosote at 100–150° C. The following results [shown in tables, graphs and photographs] were obtained: (1) complete penetration by Na pentachlorophenate was obtained; (2) creosote penetrated more readily into wood with a high moisture content (absorption of creosote about 350 kg./cu.m.) than into air-dry wood (120 kg./cu.m.), though the former tends to split when given this treatment. Excellent results are obtained by treating wood, previously subjected to the Na-pentachlorophenate process and of a high m.c., with creosote until fibre-saturation point is reached. *From author's summary.*

2115. **Portable treating plant for fence posts.** *For. Equipm. Note, FAO* No. *E.*5.55, 1955. pp. 1.

Cf. *For. Abstr.* 16 (No. 2346).

2116. WALTERS, C. S., and MCMILLAN, F. W. **Report on Project 301-C. Preservative treatment of fence posts with toxic oil solutions by cold-soaking, dipping and brushing.** *For. Note Ill. agric. Exp. Sta.* No. 52, 1955. pp. 4.

Tabulated data on service tests of Green Ash, River Birch, Cottonwood, Sassafras, Sycamore [*Platanus occidentalis*], Tupelo, Willow, Eastern Red Cedar, Shortleaf Pine and Loblolly Pine, treated with different concentrations of Cu naphthenate and PCP. [Cf. *For. Abstr.* 11 (No. 3088).]

2117. WALTERS, C. S. **Report on Project 301-A. Preservative treatment of fence posts by cold-soaking in pentachlorophenol/fuel-oil solutions.** *For. Note Ill. agric. Exp. Sta.* No. 55, 1955. pp. 4.

Cf. *For. Abstr.* 12 (No. 2196).

2118. WALTERS, C. S., and PETERSON, K. R. **The cold-soak preservative treatment of Persimmon [*Diospyros virginiana*] posts.** *For. Note Ill. agric. Exp. Sta.* No. 61, 1955. pp. 2. 1 ref.

2119. NOWAK, A. Zur Frage der Nachpflege von Masten und Schwellen. **[After-treatment of poles and sleepers.]** *Mitt. öst. Ges. Holzforsch.* 7 (4), 1955 (55–7). 4 refs. [G.] P.R.

Summarizes the following methods of preservation: (*A*) poles: (1) tarring with a brush; (2) the Mayerl (or Jutland) method; (3) the Heimann (or Furnos) method; (4) oil/salt pastes, and (5) salt bandages; (*B*) sleepers: (1) protection by means of salt cartridges; (2) filling of cracks.

2120. WALTERS, C. S. **Effects of corn silage liquor on two wood preservatives.** *For. Note Ill. agric. Exp. Sta.* No. 54, 1955. pp. 4.

The deterioration of wooden silo door panels is attributed to weathering, fungi, and the action of highly acidic silage liquors. Tests were made of the effect of corn-silage liquor on the stability of two wood preservatives—PCP and Cu naphthenate. It is concluded that deep penetration and high retentions of these substances would be necessary to withstand the deteriorating effect of the silage liquor. Addition of water-repellent materials to the preservative was ineffective.

2121. MURPHEY, W. K. **Creosote resistant to leaching by silage liquors.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 25, 1955. pp. 2. 1 ref.

In a small-scale test, pressure-creosoted hardwoods used in silo doors showed very small loss of creosote, and no signs of decay or chemical deterioration, while untreated doors showed all degrees of decay from moderate to extreme.

842. Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire

See also Nos. 2040, 2074, 2077.

2122. **Modified wood.** *For. Res. India Burma 1950–51, Pt. 1* 1955 (75–7).

Acetylation was carried out on veneer of *Terminalia myriocarpa*, *Bombax malabaricum* and *Mangifera indica*. Acetylated wood had a slightly lower strength than controls; moisture absorption and shrinkage and swelling with changing atmospheric conditions were considerably reduced; decay resistance was much increased. Acetylation appeared slightly to reduce the strength of glue joints.

2123. STERLIN, D. M., and ŠEĬDIN, I. A. O metodah opredelenija soderžanija suhoĭ smoly v propitannom špone. **[Methods of determining the content of dry resin in impregnated veneer.]** *Derev. Prom.* 4 (2), 1955 (17–9). [Russ.russ.] P.O.

According to the existing [U.S.S.R.] instructions, the dry-resin content in resin-impregnated veneer is determined from the formula

$$X = \frac{H-a}{H} \times 100\%,$$

where X = % content of dry resin in relation to the weight of dry impregnated veneer, H = weight of the impregnated and dried veneer, and a = weight of dry veneer before impregnation. This method is criticized as giving inconsistent results, and another method is suggested. Specimens of 100-mm. diameter are cut from control veneer (at least 100 mm. from edge), and their weight (P_1) in oven-dry condition is determined. After impregnation and drying, 3 specimens of the same size as before are cut from the same veneer sheets, again at least 100 mm. from the previous specimens, and their weight (P_2) is determined after oven-drying (100–105° C.). The resin content is then

$$\frac{P_2-P_1}{P_2} \times 100\%.$$

2124. ŠEĬDIN, I. A., RAKIN, A. G., and DEMIDOVA, L. A. O fiziko-mehaničeskih svoĭstvah drevesnosloistyh plastikov. **[Physical and mechanical properties of improved laminated wood.]** *Derev. Prom.* 4 (9), 1955 (12–5). [Russ.] P.O.

Tabulates the following data for 'Delta' wood with different resins and resin contents: (1) strength and density (mean, maximum and minimum values); (2) water sorption as function of the resin content and heat and pressure treatment; (3) swelling as function of resin content and soaking time.

2125. KAN, G. A., and BABOČKIN, P. N. Novyĭ drevesnosloistyĭ plastik. **[A new improved [laminated] wood.]** *Derev. Prom.* 4 (1), 1955 (13–6). 2 refs. [Russ.] P.O.

Describes the manufacture and applications of the DSP–KB improved wood made from pre-densified veneer and 4–5% of phenol-formaldehyde resin. The average density of the wood is 1·30 g./c.c., moisture content 4·9%, shear strength 179 kg./sq. cm., compression strength 2038 kg./sq. cm. It has been used successfully for bushings.

2126. KOLÁŘ, E. Vrstvené válcované dřevo—jeho využití v průmyslu. **[Pre-rolled laminated wood—its use in industry.]** *Dřevo, Praha* 9 (11), 1954 (255–7). [Cz.] From *abstr.* in *Prehl. lesn. Lit.* 6 (6), 1955 (No. 2301). [Cz.] P.R.

Describes the method of making improved wood, developed in Czechoslovakia, and its applications in the building and textile industries.

2127. GOTO, T., and KADITA, S. **[Studies on impregnated woods. III. Relation between pressing**

pressure and dimensional stability.] *Wood Res., Kyoto* No. 12, 1954 (39–54). 7 refs. [Jap.e.]

Specimens of the sapwood and heartwood of *Chamaecyparis obtusa* and *Betula nikoensis* were vacuum-impregnated with pre-polymerized phenol-formaldehyde resin, freed from resin excess, subjected to compression ranging from 0 to 150 kg./sq. cm. at 150° C., weighed and measured, freed from soluble resins by soaking in water, again measured and weighed, and finally dried. The recovery-efficiency (swelling %) and antishrink % efficiency (relative shrinkage of untreated *vs.* treated specimens, in %) were then determined. Graphs and tables show the density of the improved wood, the recovery, and the antishrink efficiency, as functions of the compression used.

2128. STAMM, A. J., and SEBORG, R. M. **Forest Products Laboratory resin-treated wood (Impreg).** *Rep. U.S. For. Prod. Lab., Madison* No. 1380 (rev.) 1955. pp. 10 + 2 tbls. P.R.

Cf. *For. Abstr.* 8 (No. 1182).

2129. HUHRJANSKIĬ, P. N. Vlijanie vlažnosti na svoĭstva pressovannoĭ drevesiny. **[Effect of moisture content on the properties of compressed wood.]** *Derev. Prom.* 4 (8), 1955 (15–7). [Russ.russ.] P.O.

Experiments with Pine, Birch and Aspen showed that: (1) The nature of the shrinkage and swelling curves for woods of 40 and 50–55% compression value is almost the same for these 3 species. (2) Up to moisture content (m.c.) of ca. 20% the tangential shrinkage and swelling occur linearly, whereas beyond 20% the curve is of the second order; for radial shrinkage and swelling the curves are less rectilinear. (3) In all cases the radial shrinkage is 1·5–2 times as great as the tangential shrinkage. (4) The moisture increase alters the compression strength of compressed wood in a somewhat greater degree than that of native wood. (5) The equilibrium m.c. of compressed wood is less than that of native wood.

2130. HUHRJANSKAJA, T. P. Pročnostj, razbuhanie i rentgenostruktura naturaljnoĭ i spressovannoĭ drevesiny buka. **[Strength, swelling and X-ray structure of natural and compressed Beech wood.]** *Tekstiljnaja Promyšlennostj, Moskva* 15 (1), 1955 (44–7). [Russ.] P.O.

Presents the results of an investigation into the change in fundamental physical and mechanical properties of wood compressed by different methods. In radial compression, wood compressed after steaming was found to have higher compression strength, and that compressed after dry heating to show less swelling. The former has more ordered fibrils than the latter and, hence is more elastic. Pre-steamed wood is recommended for bearings used in the textile industry.

843. Fireproofing and Fire Resistance

2131. WALTER, G. E., HORNSTEIN, I., and SHELD, C. A. (to the Glenn L. Martin Co.). **Flameproofed article and method of making same.** *U.S. Patent* No. 2,660,542, Nov. 24, 1953. pp. 5. 9 refs. P.O.

The flameproofing impregnant is a solution containing triallyl phosphate, brominated triallyl phosphate and a peroxide catalyst; the impregnant is polymerized *in situ* on the material to be flameproofed.

2132. ROUYER, B.-J. Procédé pour imprégner les matériaux d'un produit ignifuge et matériaux conformes à ceux obtenus. **[Method of impregnating materials with a fireproofing agent.]** *French Patent* No. 1,059,618, March 26, 1954. pp. 1. [F.] P.O.

Impregnation with a K silicate solution of appropriate concentration.

2133. N. V. LAK-, VERNIS EN VERFFABRIEK MOLYN & Co. Perfectionnements apportés aux procédés de préparation de produits ignifuges. **[New fireproofing agents.]** *French Patent* No. 1,062,810, April 27, 1954. pp. 3. [F.] P.O.

A water-insoluble NH_4 compound is mixed with a binder so as to obtain a mass that can be brushed or sprayed, after which one or more acid salt and nitrites or nitrates and/or organic nitro or nitroso-compounds are added.

2134. SCHULENBURG, W. (to Deutsche Gold- und Silber-Scheideanstalt). Feuerschutzmittel. **[Fireproofing agent.]** *German Patent* No. 922,482, Jan. 17, 1955. pp. 4. [G.] P.O.

The agent consists of a salt of a basic N-containing resin with a non-oxidizing mineral acid (e.g. phosphoric acid), the resin component being a condensation product of an aldehyde with derivatives of 1, 3, 5-triazin or their substitution products.

2135. **Development of a fire-retardant cum antiseptic composition.** *For. Res. India Burma 1950–51, Pt. I,* 1955 (80).

Work was started on a project to develop a combined fireproofing and preservative treatment for bridge sleepers. A compound containing H_3BO_3, $CuSO_4$, $ZnCl_2$ and $Na_2Cr_2O_7$ in the proportion 3/1/5/6 gave satisfactory results, and service tests are to be made on sleepers of *Pinus longifolia* and *Terminalia tomentosa.*

2136. HERZIG, J., and MANG, O. Vergleichende Brandversuche an ungetränkten und mit Feuerschutzmittel getränkten Hölzern. **[Comparative inflammability tests with untreated and fireproofed woods.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (64–70). 10 refs. [G.g.] P.R.

Discusses the results of tests on sticks (Pine, Spruce) impregnated with a triple-purpose (protection against fire, fungi and insects) phosphate-base agent, or with U preservative. Both the size of the test-pieces and the conditions of tests were very near to those encountered in practice. The effectiveness of fireproofing agents depends much less on the wood species and surface relief than on wood dimensions and retention of the preservative (in g./sq. m. or kg./cu.m.). The agent tested was found to be effective. It should be applied by immersion or by pressure, as coating is not sufficient. The U preservative was found to have no fireproofing properties.

844. Attack by Plant Organisms

2137. MATHIESEN-KÄÄRIK, A. Einige Untersuchungen über den Sporengehalt der Luft in einigen Bretterhöfen und in Stockholm. **[Spore contents of the air in some timberyards and in Stockholm.]** *Svensk bot. Tidskr.* 49 (3), 1955 (437–59). 46 refs. [G.g.] O.B.D.

Presents the results of analyses over the space of a year of the spore-contents of the air in (1) the grounds of a forest experiment 'station', (2) a well kept timberyard, (3) other timberyards, and (4) the laboratory. In (1) highest spore contents occurred from July to September, with a maximum in July. In (2) spore-contents of the air were very much lower than in (1). In (3) contents were equal to or higher than those of (1), the maximum being 893 spores/dm.²/hour in October. In (4) spore contents were lower than in the open. Ultra-violet rays used for sterilization gave good results. *From author's summary.*

844.1. Sap-staining and Mould Fungi

See Nos. 1709, 2211.

844.2. Wood-destroying Fungi

See also Nos. 1166, 1709, 1735–41, 1821, 1985–6, 2095.

2138. MATTERS, C. N. **Project P.11. The characteristics of Australian decay and stain fungi. Sub-project P.11–12. The identification of Basidiomycete fungi in culture. Progress report No. 6. Morphological characters of *Polyporus gilvus* (Schw.) Fr. and *Polyporus scruposus* Fr.** Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 10 + 10 photos + 5 tbls. 10 refs.

Cf. *For. Abstr.* 16 (No. 4697).

2139. MATTERS, C. N. **Project P.11. The characteristics of Australian decay and stain fungi. Sub-project P.11–12. The identification of Basidiomycete fungi in culture. Progress report No. 7. Morphological characters of six isolates of *Coniophora cerebella* Fers.** Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 13 + 14 photos + 5 tbls. 3 refs.

2140. MATTERS, C. N. **Project P.11. The characteristics of Australian decay and stain fungi. Sub-project P.11–12. The identification of Basidiomycete fungi in culture. Progress report No. 8. Oxidase reactions of ten species of wood-destroying fungi.** Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 8 + 18 photos. 2 refs.

2141. LAW, K. **Laccase and tyrosinase in some wood-rotting fungi.** *Ann. Bot. (n.s.)* 19 (76), 1955 (562–70). 12 refs. O.R.E.

Several species of wood-rotting fungi were examined for phenol oxidases (methods given). *Polystictus sanguineus*, a white rot, produced laccase, secreting it into the medium. *Phellinus cryptarum*, another white rot, varied with the medium, producing only laccase on a malt medium, but both laccase and tyrosinase on a glucose/salt medium. *Lentinus lepideus*, a brown rot, produced tyrosinase on several media. The enzyme appeared to be entirely intracellular. *From author's summary.*

2142. BIRKINSHAW, J. H., and CHAPLEN, P. **Biochemistry of the wood-rotting fungi. 8. Volatile metabolic products of *Daedalea juniperina* Murr.** *Biochem. J.* 60 (2), 1955 (255–61). 14 refs. O.R.S.

2143. ZAŠEV, B. Găbi, pričinjavašti gniene na dărvenija material v mini Dimitrovo. **[Wood-destroying fungi in pitprops at the 'Dimitrovo' coal mines.]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (173–84). 12 refs. [Bulg.russ.]

Lists 12 species of Polyporaceae, 5 of Agaricaceae and 1 each of Thelephoraceae and Hydnaceae.

2144. BÁLINT, G. Épületekben fellépö egyes fapusztítógombák és rovarkártevök, valamint azok hatásának vizsgálati eredményei. **[Damage to timber by fungus and insect infestation in buildings, and a survey of its effects.]** *Faipar, Budapest* 5 (8), 1955 (210–3). [Hu.] X.

A lecture dealing mainly with damage by fungi, including their post-war incidence in Budapest buildings. There is much more damage by *Coniophora cerebella* in Budapest than in Leningrad and Kiev. This is due partially to insufficient insulation in old houses and to unfavourable soil conditions, but is chiefly the aftermath of severe damage during the siege of the city. About 61% of the infestations recorded continue in the active stage, endangering the construction of buildings. Moist conditions rather than fungi such as *Merulius lacrymans* seem to be the cause of the high incidence of infectious diseases in affected houses, but there is some evidence of a direct relationship between human allergies and heavy fungal infestation. About 4% of the affected roofing is also attacked by *Hylotrupes bajulus*, *Anobium punctatum* and *Lyctus linearis*, pests even more difficult to control than fungi. The seriousness of the situation and the importance of energetic control measures are stressed.

2145. MIZUMOTO, S. **[On the relative durability of woods of some broadleaved trees to decay.]** *Annals of the Phytopathological Society of Japan, Tokyo* 18 (3/4), 1954 (97–101). 11 refs. [Jap.e.] H.S.B.

Of the 13 species tested in the laboratory, the heartwoods of *Castanea crenata* and *Zelkova serrata* proved most, and the sapwoods of *Alnus japonica* and *Prunus yedoensis* least resistant to the 5 fungi used. Of these *Polystictus sanguineus* and *P. hirsutus* attacked the specimens most vigorously, and *Schizophyllum commune* least. *From author's summary.*

2146. FINDLAY, W. P. K., and BADCOCK, E. C. **Dote in Beech logs.** *Timb. Tr. J.* 215 (4126), 1955 (78–9).

Beech logs held in the round through the summer months, and not ponded, are subject to dote (incipient decay). Experiments in spraying and end coating are described, from the results of which it is concluded that the ends and other cut surfaces of Beech and similar timbers (Ash, Sycamore) should be brushed over with 5% Na PCP or creosote immediately after felling and cross-cutting, and then end-coated with a moisture retardant. This will

greatly reduce dote. The first dominant fungus developing in these logs was *Stereum purpureum*.

2147. SCHMIDT, J. Beskyttelse af bøgetræ mod svamp og misfarvning. **[Protection of Beech timber against fungi and discoloration.]** *Træindustrien* 5 (4), 1955 (46–7). [Dan.] P.R.

In preliminary experiments, Beech coated with different commercial preparations and left in the forest for 8 months only showed stain damage close to the cut end. Preservation of timber exposed to sunshine in a timber yard was less successful. No details of results are given.

845. Attack by Animals

845.1. Marine Borers

2148. TRUSSELL, P. C., FULTON, C. O. CAMERON, C. J., and GREER, B. A. **Marine borer studies: evaluation of toxicants.** *Canad. J. Zool.* 33 (4), 1955 (327–38 + 1 photo). 16 refs. O.R.S.

Na arsenite was the most toxic of 115 compounds tested for toxicity to adult *Bankia setacea*. It gave a complete kill at 25 p.p.m. (as As_2O_3) after 18 hours' exposure. The relative toxicity of chemically pure Na arsenite and of various commercial concentrations was measured; all but one of these killed all *B. setacea* in 18 hours at 25 p.p.m. As_2O_3. The minimum concentration of Na arsenite needed to kill *B. setacea*, using commercial preparations, was determined for exposure periods ranging from 10 min. (1000 p.p.m. As_2O_3) to 12 hours and upwards (25 p.p.m.). In limited observations on the toxicity of Na arsenite to *Limnoria* spp., the same concentrations proved effective.

2149. GANAPATI, P. N., and NAGABHUSHANAM, R. **Crustacean wood borers of Viskhapatnam harbour.** *Curr. Sci.* 24 (6), 1955 (200–1). 1 ref. A.P.B.

Describes species of wood borer found in jetties and in fishermen's catamarans, viz. *Metoponorthus* sp., *Sphaeroma terebrans* and *S. walkeri*.

845.2. Terrestrial Borers

See also Nos. 1186, 1709, 1773, 2102, 2144.

2150. PENCE, R. J., MAGASIN, S. J., and NORDBERG, R. G. **Detecting wood-boring insects. Electronic device developed as aid in locating insects destructive to timber and wood products.** *California Agriculture, Berkeley* 8 (11), 1954 (5). L.S.

Describes a high-gain, low-noise frequency selective amplifier designed to be receptive to the footfall of a single dry-wood termite, one of the quietest of wood-destroying insects. A highly sensitive pick-up bears a needle-like probe that can be pushed into any wood surface leaving a hardly noticeable hole. [Cf. *For. Abstr.* 16 (No. 2388).]

2151. OSMUN, J. V. **Recognition of insect damage. Section three: Wood and wood products.** *Pest Control* 23 (7), 1955 (20–2). D.S.I.R.

Description, with 10 illustrations, of 14 types of damage.

2152. FAIREY, K. D. **The Lymexylidae—another family of pin-hole borers.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 8 (3/4), 1955 (15–9). 5 refs.

An illustrated note on the damage and biology of these insects, with a list of the species recorded in Australia (*Atractocerus*, 4; *Hylecoetus*, 5; *Lymexylon*, 1).

2153. CASIMIR, J. M. **The common furniture beetle.** *Aust. For.* 19 (1), 1955 (26–34 + 2 plates). 16 refs.

Reviews recent work on the life history and control of *Anobium punctatum*.

2154. EATON, C. B., and LYON, R. L. ***Arhopalus productus* (Leo.) a borer in new buildings.** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 11, 1955. pp. 11. 12 refs.

Describes the insect, its range, host trees, biology, examples of damage in buildings, and control.

2155. ROWELL, J. O. **Black carpenter ant injury.** *Pest Control* 23 (8), 1955 (44, 46). D.S.I.R.

Description of the damage done by *Camponotus herculeanus pennsylvanicus* and of control methods.

2156. KINGHORN, J. M. **Post-attack chemical treatment for ambrosia beetles.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (5), 1955 (3).

Small-scale experiments with stocks of Douglas Fir infested with *Trypodendron* sp. showed that spraying, one week after attack, with an emulsion containing 0·4% lindane and 5% $C_2H_4Br_2$ arrested the development of beetles in the wood and prevented subsequent attacks. The method might be used against attacks on freshly sawn lumber of high value.

2157. ACKERMANN, H. Holzwurmvertilgungspaste. **[Paste for controlling timber insect pests.]** *Swiss Patent* No. 286,791, Nov. 16, 1953. pp. 1. [G.] P.O.

The paste consists of formalin, a synthetic glue, a finely powdered filler (e.g. chalk or wood flour), and a dye, and can be squeezed into insect holes from a tube.

845.3. Termites

See also Nos. 1183, 2106, 2150.

2158. BURGESS, H. J. **Resistance to termite attack of certain Malayan commercial timbers.** *Malay. For.* 18 (4), 1955 (209–10).

Preliminary results of tests of resistance to *Coptotermes lacteus* and *Nasutitermes exitiosus* of *Hevea brasiliensis*, *Litsea firma* and *Artocarpus rigidus*, showed that they were in that order of increasing resistance, Rubber wood being highly susceptible to attack by both species.

2159. WOLCOTT, G. N. **Control of West Indian dry wood termite.** *Shell Technical Bulletin* [*U.S.A.*] No. *ADB*: 394/*Wa*5, 1954. pp. 3. P.R.

Endrin and isodrin are more efficient than PCP against *Cryptotermes brevis*. Methoxychlor, Ryania, Nuodex, Dilan and Aramite are also recommended. Painting with, or immersing in, 1% acetone solutions of these is expected to give indefinite protection against attack.

2160. SECREST, H. C. **Effectiveness of soil poisons in controlling subterranean termites.** Southern Forest Experiment Station, New Orleans, La. 1954. pp. 5.

A summary advance report of experiments at Gulfport Forest Insect Laboratory, 1946–53, comprising (*a*) stake tests (a Pine sapwood stake is driven into soil treated with the poison), (*b*) ground board tests (a Pine board is laid on bare soil sprinkled with the poison), and (*c*) building tests (the chemicals are applied in shallow trenches along the foundation chain walls) and using the following poisons diluted either with oil (mostly No. 2 fuel-oil or kerosene) or with water, sometimes in varying concentrations and dosages (given): (1) γBHC, (2) DDT, (3) Na arsenite, (4) trichlorobenzene, (5) orthodichlorobenzene, (6) PCP, (7) monochloronaphthalene, (8) coal-tar creosote, and (9) Cu naphthenate [(*a*) and (*c*) only] with (10) chlordane, (11) dieldrin, (12) toxaphene and (13) Cu-ammonium fluoride [substituted for (4), (5), (7) and (9) in the (*b*) tests]. In (*a*) and (*c*) the first five preparations gave good results over the whole period, the last two failing after a year or two. In (*b*), (10), (11) and (12) were among the best five, (3) showing signs of failure after 3 years. Concentrations, dosages and length of effective protection refer to the Gulf Coast climate, but it has been shown that effectiveness is proportionately reduced or increased for tropical or temperate regions respectively. [No termite species are named.]

846. Steaming

See No. 2184.

847. Drying (Seasoning)

See also Nos. 1925, 1951, 2064, 2077, 2183, 2192–3.

2161. KITAMURA, H. **[On the physical properties of logs in a timber yard. II. Variation of moisture content in *Pinus densiflora*.]** *Wood Ind., Tokyo* 10 (12), 1955 (596–600). 2 refs. [Jap.e.] P.R.

Variations in moisture content of round and split logs, barked and unbarked, and stacked in a timber yard, were observed from July 1954 to June 1955. Results [given in graphs and tables] included the following: (1) Moisture contents of the split logs were unexpectedly high, presumably through absorbing rain. (2) All logs were affected by changes in weather. Ranges of variation throughout the year were: 2 split logs with bark, 25–120%; 2 split barked logs, 20–85%; 4 split logs with bark 15–80%; and round logs with and without bark 20–60%. (3) Differences in drying between barked and unbarked logs were slight and barked logs absorbed rain more readily. It is concluded that barking has no effect on seasoning of logs in a timber yard. (4) Logs in the middle of a stack had lower moisture contents than the other logs. *From author's summary.*

2162. HROMCOV, M. I. **[Air seasoning of sawn timber in winter.]** *Derev. lesohim. Prom.* 3 (6), 1955 (21–2). [Russ.] From *abstr. in Chem. Zbl.* 126 (12), 1955 (2805–6). [G.] L.S.

Pine boards 25 mm. thick and of 58% moisture content lost in winter 0·58% m.c. per day.

2163. WALTERS, C. S. **Kiln-drying green Eastern Cottonwood [*Populus deltoides*].** *For. Note Ill. agric. Exp. Sta.* No. 53, (rev.) 1955. pp. 2.

2164. **The treatment of timber in a drying-kiln.** *Leafl. For. Prod. Res., Lond.* No. 20 (rev.) 1955. pp. 8. P.R.

Cf. *For. Abstr.* 3 (p. 326).

2165. CAREV, B. S. Ustanovka nastennogo psihrometra v lesosušiljnyh kamerah. **[Wall-type psychrometer in wood-drying kilns.]** *Derev. Prom.* 4 (8), 1955 (7–8). 5 refs. [Russ.] P.O.

A system is described, using the usual wall-type psychrometer with standard straight thermometers, the bulb ends of which are inside the kiln.

2166. KÜBLER, H. Die elektrische Temperaturmessung, unter besonderer Berücksichtigung der Kammertrocknung von Schnittholz. **[Electrical measurement of temperature with particular reference to the kiln-drying of sawn timber.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (41–52). 6 refs. [G.g.] P.R.

Discusses the required accuracy of temperature measurement, and describes thermocouples and resistance thermometers with their accessories. Thermocouples are cheaper, but give less accurate results than resistance thermometers; they are, however, of sufficient accuracy for measurements of air humidity and wood moisture content.

2167. ANDERSSON, R. Wärmebedarf und Wärmeverbrauch bei der künstlichen Holztrocknung unter besonderer Berücksichtigung der Wärmerückgewinnung bei der kontinuierlichen Trocknung. **[Heat requirements and heat consumption in artificial wood drying with special reference to heat recovery in continuous drying.]** *Holz Roh- u. Werkstoff* 13 (7), 1955 (258–66). 32 refs. [G.g.] P.R.

Derives a general equation for the total energy consumption during wood drying, expressed in kcal./kg. evaporated water, and develops from it special equations for kiln driers, continuous driers without and with heat recovery, and high-temperature driers; heat consumption is found to decrease, as a rule, in that order. A heat-recovery unit can reduce the total heat requirement by 10–20% and the problem of increasing its size is analysed from the economic standpoint. An equation is developed, under certain assumptions, for evaluating the economic justification of such a unit. While the results of calculation of two practical cases point to the advisability of attaining a temperature efficiency of ≈ 1, economic considerations (the size of the heat-recovery unit) reduce the commercially applicable temperature efficiency value of the unit to ca. 0·8.

2168. KEYLWERTH, R., GAISER, H., and MEICHSNER, H. Untersuchungen an einer Heissdampftrockenanlage. **[Investigations on a seasoning plant operating with superheated steam.]** *Holz Roh- u. Werkstoff* 13 (1), 1955 (5–20). 11 refs. [G.g.] P.R.

The temperature field, drying process, drying time and power consumption, as well as the distribution of air velocity, were studied in a Benno Schilde

superheated-steam drier for a charge of 3–4 cu.m. of trimmed sawn timber. Both the temperature and air-current fields were found to be very advantageous for seasoning purposes. Green or air-dry Pine and Spruce wood (18–45 mm.) could be seasoned in pure steam at 115–132° C. Air-dry broadleaved woods (Birch, Oak, Iroko, Teak, 20–80 mm.) were seasoned at 110–127°. It was found expedient to measure the temperature of the wood during seasoning so as to follow the moisture content (m.c.) of the wood below fibre-saturation point. The numerical coefficient in Keylwerth and Kübler's formula for the seasoning period [cf. *For. Abstr.* 15 (No. 2012)] was found to depend on the initial m.c. The power consumption was slightly less than in kilns operating below 100°.

2169. KEYLWERTH, R., GAISER, H., and MEICHSNER, H. **Research work on a superheated steam kiln.** *Transl. For. Prod. Lab., Can.* No. 90, 1955. pp. 32. Transl. from *Holz Roh- u. Werkstoff* 13 (1), 1955 (5–20). [See preceding abstract.] Limited distribution. P.R.

2170. KREČETOV, I. V., and CAREV, B. S. Uskorenie suški pilomaterialov povyšeniem temperatury processa. **[Accelerating the seasoning of sawn timber by raising the temperature of seasoning.]** *Derev. Prom.* 4 (1), 1955 (3–6). 3 refs. [Russ.] P.O.

Summarizes the results of experiments by: (1) *N. N. Čulickiĭ* (Investigation of drying schedules for Pine wood for aircraft construction, 1932 and 1934; Investigation into the factors and features of wood-drying schedules, 1934, Moscow-Leningrad); (2) *V. P. Mironov* and *B. A. Posnov* (publication not indicated), and (3) *S. N. Abramenko* (Effect of H.F. drying on the properties of wood, from the book: *Drying and heating of wood in an H.F. field*, 1938, Moscow and Leningrad), and gives drying schedules for seasoning coniferous sawn timber in industrial gas- and steam-heated kilns with final temperatures of 105–110° C. The drying period was reduced to $\frac{2}{3}$–$\frac{1}{2}$ of that in conventional drying. Neither the uniformity of drying nor the internal stresses were worsened by this process.

2171. HÖTERKES, J. Das Klimatisierungsproblem in Holzbetrieben. **[Conditioning in woodworking industries.]** *Holz-Zbl.* 81 (150), 1955 (1787–8). [G.]

A lecture, discussing the need for careful control (mainly increase) of the moisture content of fibreboards, chipboard, sandwich board and plywood, most of which leave the presses with m.c. < 10%, and also flooring blocks, etc., in suitable conditioning chambers. Various types are described, mostly using running water heated to the temperature required to obtain a given humidity at a given temperature. Sometimes two-compartment chambers—with different air conditions in each—are used. The author cites the experience of a manufacturer of barrels from Beech plywood staves, the outer veneers of which were liable to crack along the grain. Treating them for 5 days in a chamber where humidity alternated from 85% to 35% every 12 hours, at a constant 20° C., eliminated this defect. The need for air conditioning in all woodworking shops and storage spaces is also stressed.

2172. ČERNAEV, P. Sravnitelni izučvanija vărhu ustroĭstvoto na različnite tipove sušilni za dărveni materiali u nas i efekta na izsušavaneto. **[Comparative investigation of the design of different kiln types in Bulgaria and of the efficiency of seasoning.]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (201–31). 10 refs. [Bulg.bulg.russ.]

Illustrated description of 5 types of kiln, their merits, and recommended modifications.

2173. TERAZAWA, S., NAKADA, S., and YAMAMOTO, A. **[Studies on the technique of developing a drying process for wooden spinning bobbins.]** *Wood Ind., Tokyo* 10 (3), 1955 (116–23). 5 refs. [Jap.e.] P.R.

The use of kilns with an internal fan, rather than those with natural ventilation as used so far, reduced the drying time to $\frac{1}{4}$ or $\frac{1}{8}$ without reducing quality below acceptable levels.

2174. Erfahrungen und Einsatzmöglichkeiten moderner Holztrockner im Klein- und Mittelbetrieb. **[Installation and value of modern timber driers for small and medium-sized firms.]** *Int. Holzmarkt* 1955 (5), (42–4). [G.]

Describes with illustrations different models of the Kleintrockner HD 74, produced by Firma Robert Hildebrand, Oberboihingen, and discusses the different heating units available for use with them. Some examples of drying times are given, e.g. 1 day for 24-mm. Spruce to be dried from 55 to 10%, 13 hours for 24-mm. Beech to be dried from 25 to 12%, and 26 hours for 45 × 45-mm. Birch to be dried from 25 to 12%. One of the smaller models will take a timber stack of 800 × 1000 × 2500 mm., while the larger models have 2–3 times this capacity.

2175. VENKATADAS, R. **Seasoning and preservative treatment of green Northern White Pine with an acetone solution of pentachlorophenol.** *Comp. Wood* 2 (3), 1955 (70–80). 14 refs. P.R.

[Cf. *For. Abstr.* 6 (p. 246).] Green (moisture content 75–150%) specimen boards, 36 × 8 × 1 in., of *Pinus strobus* were subjected to a 25-in. vacuum for an hour, 5–10% PCP solution in acetone was then introduced and the boards kept in the solution under different pressures for different periods, after which their acetone and moisture contents, and the penetration and retention of the preservative were determined. The drying rate, which appears to increase with the pressure applied, averaged 9·2%/hour under 100 lb./sq. in.; the m.c. decrease during 8 hours was 58·1% (from 133·0 to 74·9%). A minimum pressure treatment of 8 hours seems necessary to effect good seasoning. A preservative retention equivalent to 0·5–1·0 lb. PCP/cu. ft. was obtained in most cases from a 10% solution, higher pressure and longer treatment giving a more uniform distribution within the wood. The results are tabulated, and the merits of the process discussed.

2176. HAFNER, T. Wirtschaftlichkeit der Anwendung der Hochfrequenz-Erwärmung in der Holzindustrie. [**The economics of using high-frequency heating in the wood industry.**] *Int. Holzmarkt* 1955 (15), (21–4). [G.]

Includes graphs showing the relationship of various factors to drying costs.

2177. FOLOMIN, A. I. Vysokotemperaturnaja suška drevesiny v petrolatume. [**High-temperature seasoning of wood in petrolatum.**] *Derev. Prom.* 4 (4), 1955 (3–7). [Russ.] P.O.

Discusses the process of wood seasoning at temperatures below and above 100° C. The difference between the partial pressures of water vapour in the body of the wood and outside it brings about (1) the diffusion-migration of water vapour, (2) the flow of the air/vapour mixture, and (3) the migration of liquid water through very small capillary channels. The total quantity of water lost by wood owing to this difference of partial pressures is only a small fraction compared with that lost through the large excess of internal pressure (vapour + air) in the body of the wood. After pointing out the disadvantages of low-temperature (< 100°) and high temperature (> 100°) kiln-drying (in the first place the necessity for maintaining high air humidity for a considerable part of the drying process), the author describes a process of seasoning wood in hot petrolatum, in which the removal of moisture occurs only in accordance with the second mechanism (excess pressure in the wood). Wood is boiled in open steel tanks 7 × 1·6 × 2·2 m. with steam-heating; the stickered stack is weighted down by a hinged steel frame. Coniferous woods were dried at temperatures up to 140°, Hornbeam, Beech and Oak at 100–120°; but in some cases a pre-steaming was indicated to remove most of the air. Practically no degrade occurred. Final m.c. was 10% and 3% for the boiling temperatures of 110° and 140°, respectively. Petrolatum being a very viscous liquid, its penetration of coniferous woods does not exceed 1–1·5 mm. unless the temperature in the tank is lowered after heating. Consumption of petrolatum was found to be 300–350 g./sq. m. of unplaned surface. Methods are described preventing the excessive formation of foam during the process. The heat economy of the process is discussed in detail. It is claimed that the process is cheaper than conventional kiln-drying, both in plant and running cost; that the m.c. after drying is uniform throughout the wood; that the time required is very short, and the wood is fully sterilized and less vulnerable to fungal attack; and that its mechanical properties are not lowered. This method is suitable for thicker assortments as well as boards. Examples of drying performance are: (1) softwood boards from 45–50% to 5% m.c. at 120°; 2-cm. boards required 3 hours, 6·5-cm. boards, 16 hours; m.c. gradient nil; (2) Hornbeam scantlings, 5 × 6 cm., of 30% m.c. were first steamed and then dried at 110–115° for 12 hours to 7% m.c.; m.c. gradient very small.

2178. Der Wirbeltrockner. [**The 'whirl drier'.**] *Holz-Zbl.* 81 (157), 1955 (1863). [G.]

Describes a cylindrical drier for small wooden articles such as spools, tool handles etc. An axial fan in the centre of the drum drives the air round ca. 4000 times/hour. Round it is a circular heater which can be thermostatically controlled. Driers of 0·55, 1·35 and 2·35 cu.m.capacity can be supplied by Gg. Kiefer, Stuttgart.

2179. FARBER, E. (to Fine Hardwoods Assoc.). **Process of impregnating and drying wood and composition therefor.** *U.S. Patent* No. 2,686,741, Aug. 17, 1954. pp. 4. 4 refs. P.O.

Shrinkage of wood upon drying is prevented by treating with urea, and hydroxyacetic acid or its salts (application by dipping or brushing, using an aqueous solution).

848. Timberyard Practice. Handling and Storage of Timber

See also Nos. 1652, 2137, 2161, 2184.

2180. **Log handling devices.** *Lumberm.* 82 (11), 1955 (86 . . . 98, 101, 119).

Includes a list of American manufacturers of log-handling devices of the fork lift, tong or grapple type, with details of the principal equipment furnished and some photographs.

2181. **Speedier cargo handling.** *Timb. Tr. J.* 215 (4138), 1955 (78–80).

An illustrated account of the application by Burt, Boulton and Haywood Ltd., Belvedere, Kent, of the green-chain principle. Cranes unload from ship to quayside sorting tables and the sorted timber is moved by straddle truck to the piling sheds and area. The objects are to pile away at or near the rate of discharge; to keep the quay clear of timber; and to make timber immediately available to consumers.

2182. RUNGE, F. W. Mobilkrane sind vielseitige Arbeitsmaschinen. [**The Mobilkran (a mobile crane), a versatile piece of working equipment.**] *Holz-Zbl.* 81 (97), 1955 (1153). [G.]

Describes two models (a 2·5-ton and a 7-ton) of this combined tractor and crane, with its ancillary load-handling equipment of special interest to wood-working industries.

849. Miscellaneous

2183. SII, S., and HASIMOTO, H. [**The [effects of] boiling treatment on Apitong [*Dipterocarpus* spp.].**] *Wood Ind., Tokyo* 10 (2), 1955 (76–82). [Jap.e.] P.R.

Boiling for 4 hours is enough to remove the resin that causes painting difficulties, but does not affect the mechanical properties of the wood. Radial and tangential shrinkage of boiled wood were slightly below that of controls. Boiled wood needed a shorter period of seasoning and there were fewer seasoning difficulties. *From authors' summary.*

2184. BRYKIN, K. I. O hranenii i teplovoï obrabotke bukovoï drevesiny. [**Storage and heat-treatment of Beech wood.**] *Derev. Prom.* 4 (4), 1955 (22–3). [Russ.] P.O.

Recommends storage in water. No substantial differences in degrade % are found between boiling and steaming. The temperature should never exceed 70° C., optimum temperature of treatment being 50–60°.

85. Grading of Wood and Wood Products

851. Timber Quality in General

See also No. 1998.

2185. Bokščanin, Ju. R. Listvenničnoe pilovočnoe syrje Sibiri. [**Larch sawtimber in Siberia.**] *Lesn. Prom.* 14 (3), 1954 (29–31). [Russ.] L.S.

A study of 5000 Larch (*Larix sibirica*) logs in Central Siberia showed that: (1) the modal values for log number and volume fall in the 28–30 cm. and 32–34 cm. d.b.h. classes respectively; (2) the most frequent (51%) log length is 5·5 m., and the 3 lengths of 4·5, 5·5 and 6·5 m. total 94% of all logs; (3) some of the 38-cm., and ⅓ of the 46-cm. top-diameter logs, have a butt diameter $\lessdot$ 64 cm.; a frequency table for different butt diameters for a given top diameter is presented. Another table gives the occurrence of various defects (knots, splits, rot, curvature, other growth defects, and technical cross-section rejects) for different diameters, based on the Soviet standard GOST 1047–51.

2186. Taffe, W. Gütebewertung des Fichtenholzes verschiedener Standorte und Ertragsklassen in Rheinland-Pfalz. [**Assessment of the quality of Spruce timber from various sites and yield classes in Rheinland-Pfalz.**] *Holz-Zbl.* 81 (148), 1955 (1769–70). 14 refs. [G.]

The article summarizes a thesis, based on investigations in 11 stands aged 81–105 years, falling into site classes I to IV, situated at 250–750 m. alt., on soils consisting mainly of greywacke, greywacke sandstones, and other Devonian weathering products, the chief factor determining site class being available soil moisture, followed by temperature (altitude). Timber quality is based on the official German grading rules for sawn timber. The chief degrade factor throughout was knottiness, accounting for over 80% of the grade estimates in all stands, whereas, e.g., red rot and undersize never exceeded 10%. Only 2% of the boards, all from one stand, were free from defects. From 2 tables, giving the distribution of sawn timber graded by crown and site classes respectively, it emerges that lower tree and site classes tend to have a higher proportion of high-quality timber; the closest correlation was with diminishing height. Green weight showed a similar tendency to be greater for timber from lower tree and yield classes. Measures to improve the proportion of high-quality timber, particularly pruning, are discussed.

852. Detection, Recognition and Assessment of Injuries and Defects

See also Nos. 1578, 1821, 1936–8, 2201.

2187. **Knots *vs.* clear lumber.** Forest Products Laboratory, Madison. (Reissued) 1955. pp. [16]. P.R.

Illustrations showing the effect of good, bad and indifferent pruning.

2188. Bosshard, H. H. Zur Physiologie des Eschenbraunkerns. [**The physiology of brown heart of Ash.**] *Schweiz. Z. Forstw.* 106 (9/10), 1955 (592–612). 15 refs. [G.g.f.]

Detailed microscopical study and mechanical tests have shown that brown heartwood of Ash (*Fraxinus excelsior*) is equal to the uncoloured wood in all strength properties. Its formation depends on weather, on the size of the trunk, and on position in the trunk. A moisture content of at least 55% and the presence of O_2 in the trunk are necessary conditions for its formation. Ash growing on droughty sites have a lower m.c., and O_2 penetrates them with difficulty except through wounds in the stem. In order to produce white wood, it is necessary to choose a site that is not too damp, and especially to avoid stagnant groundwater, and to apply a dressing immediately to any wounds in the bark of good-quality trees. [Cf. *For. Abstr.* 15 (No. 1739); 16 (No. 3550).]

2189. Lange, K. D. **Methods of detecting and removing bullets and shell fragments from saw timber located on military lands.** *J. For.* 53 (11), 1955 (806–10). 3 refs.

[Cf. *For. Abstr.* 11 (No. 410).] Steel shell splinters, bullets of 50-calibre (0·5 in.) with steel centres, and 30-calibre and less, generally of lead, were lodged in the outer 6 in. of the stem. The mill log-deck was the best place for search. Logs were scanned with the U.S. mine detector (Marks 625 SCR & H), those up to 8 in. diam. on two opposite sides, 9–12 in. on four sides, and $\geqslant$ 19 in. on six sides. Two experienced men with one assistant cleared the metal from 16,000 bd. ft./day at a cost of $2·50 per 1000 bd. ft. The small-calibre ammunition, though generally undetected, caused no material damage to saws or planers.

2190. Janson, È. R. Profilometr dlja izmerenija čistoty obrabotki drevesiny. [**Profilometer for determining the smoothness of worked wood.**] *Derev. Prom.* 4 (2), 1955 (12–4). [Russ.] P.O.

The criterion involved is the maximum height of unevennesses H_{max}; this is determined by means of an apparatus based on the principle of a hydraulic pick-up. The scanning element is an ordinary gramophone needle sharpened at an angle of 45° and with a rounding radius of 40–50 μ. The instrument has a μ scale; the value of $H_{max} \simeq$ 300–350 μ. The merits of the instrument are discussed.

2191. Ickovič, E. A. Kriterij kačestva pilenoï poverhnosti. [**Criterion of the quality of sawn surfaces.**] *Derev. Prom.* 4 (4), 1955 (14–5). [Russ.] P.O.

Describes a new method of assessing smoothness of cut, based on the area of the stain made by a drop of coloured liquid (aqueous solution of $KMnO_4$) falling from a constant height. The nominal area is obtained by multiplying the length of the stain by its width.

2192. Gertopan, V. P., and Čerevčenko, A. E. Zaščita kruglogo lesa ot torcevogo rastreskivanija. [**Protection of round wood from end splitting.**] *Lesn. Prom.* 14 (5), 1954 (9–10). [Russ.] L.S.

Illustrated description of a ring punch (with two concentric ring knives, ca. 9 and 7 cm. diam.) which, when driven into the end face of Beech logs, produces a circular incision ½-in. deep. This is claimed

to prevent the spread of star shakes beyond the periphery of the incision.

2193. GERTOPAN, V. P., and CHEREVCHENKO [ČEREVČENKO], A. E. **Preventing logs from end splitting.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2522, 1955. pp. 3 + 1 photo + 2 dgms. Transl. by M. Slade from *Lesn. Prom.* 14 (5), 1954 (9–10). [See preceding abstract.]

853. Grading of Wood in the Rough

2194. BROWN, G. S. **Draft grading rules for hardwood logs (non-Teak species) produced by countries of South East Asia and the Pacific (excepting Australia, New Zealand, and Japan).** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/28, 1955. pp. 17.

854. Grading of Converted Timber

2195. THUNELL, B. Gütebestimmung und zerstörungsfreie Prüfung von Bauholz. [**Quality grading and non-destructive testing of constructional timber.**] *Holz Roh- u. Werkstoff* 13 (3), 1955 (101–11). 18 refs. [G.g.] P.R.

Discusses the principles underlying the quality grading of timber adopted in Scandinavian countries and distinguishes, in the first place, 3 main classes: for cabinet-making, for general purposes, and for construction. Different factors influencing the quality (density, moisture content, different types of knot, width of growth rings, proportion of late wood) are described in some detail. The possibility of non-destructive testing is discussed. It is stressed that, particularly for wood, the different strength values should be given in the form of the mean value and of the scatter, rather than as the 'permissible stress'. The Swedish grading rules for constructional timber are tabulated.

2196. **Standard grading for imported Teak (squares and sawn lumber). Japan.** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/64, 1955. pp. 11.

86. Pulp Industries. Composite Materials made Wholly or Partly of Woody Matter. Chemical Utilization of Wood

2197. ***Gidroliznaja i lesohimičeskaja Promyšlennostj.*** Ministerstvo Bumažnoĭ i Derevoobrabatyvajuščeĭ Promyšlennosti, Moscow. Published 8 times a year. Price *Roubles* 5 per single copy. P.R.

Previously *Gidroliznaja Promyšlennostj SSSR* published since 1948. Vol. 8, No. 1, under the new title ['The Hydrolytic and Forest Chemical Industry'], was issued in [January?], 1955. Citation in *For. Abstr.: Gidrol. lesohim. Prom.*

2198. SNYDER, F. H. **New potentials in fibers and chemicals from wood waste.** *For. Prod. J.* 5 (5), 1955 (341–5).

Describes new product and process developments employing whole wood substance as the primary raw material, including a potentially significant material known as 'Dendrol'. This has some of the properties of thermosetting phenolic resins, thus suggesting a variety of industrial uses. Other chemicals and resins from wood waste, a new process for hardwood pulping, and uses for lignin derivatives are discussed. *From author's summary.*

861. Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives

See also Nos. 1305, 2198, 2251, 2296.

2199. **Procedure for determining the properties and characteristics of pulpwood. Forest Products Laboratory method No. 111.** *Rep. U.S. For. Prod. Lab., Madison* No. 1417 (rev.) 1955. pp. 23 + 3 photos + 2 tbls. 1 ref. P.R.

Describes the standard procedure, including: (1) identification of the species; (2) description of forest and growth conditions; (3) description of the pulpwood; (4) physical tests on whole logs; (5) physical tests on log sections; and (6) chemical analysis of the wood substance.

2200. THOMMEN, E. K. **Hardening of resins during pulpwood storage.** *Paper Tr. J.* 139 (48), 1955 (17–8). 10 refs. P.R.

Results of analysis of resin from fresh and stored chips do not bear out the theory that the reduction of pitch troubles in pulping is due to the absorption of O by the wood resins. The effect of the degree of comminution, wood seasoning, period of extraction and location in the tree, on the amount of extracted resin is briefly discussed.

2201. BHAT, R. V., and SINGH, M. M. **Indigenous cellulosic raw materials for the production of pulp, paper, and board. Part 27. Wrapping papers from Chir (*Pinus longifolia* Roxb.) of twisted grain.** *Indian For.* 81 (12), 1955 (765–73 + 4 sample sheets).

Laboratory experiments are described. The average fibre length of the twisted Chir was 4·79 mm. It is concluded that twisted Chir is a useful raw material for the manufacture of wrapping papers.

2202. MOHNSEN, K. Die Grundlagen einer äquatorial-westafrikanischen Gesamtwaldnutzung unter besonderer Berücksichtigung der Faserstoffgewinnung. [**The bases of complete utilization of forest in equatorial West Africa, with particular reference to pulp production.**] *Mitt. Bundesanst. Forst- u. Holzw.* No. 30, 1953. pp. 81. 85 refs. [G.]

A discussion, based on literature, of the possible contribution of this region to European (chiefly German) needs. Transport being a decisive factor as regards costs, its rationalization and the reduction of the volume carried, by the manufacture of pulp on the spot (including processes for the simultaneous pulping of many hardwood species) form important parts of the paper.

2203. SEABRA, L. DE. Os bambus na indústria da celulose. [**Bamboos in the pulping industry.**] *Estud. Ensaios e Docum. Junta Invest. Ultramar, Lisboa* No. 13, 1954. pp. 91 + 4 plates. 38 refs. [Port.f.]

Presents some general information on the characteristics of Bamboo compared with other paper-making species (viz. size and shape of fibres, chemical properties of the wood and cellulose, and the industrial value of Bamboo pulps) and gives

the results of preliminary trials with *Oxytenanthera abyssinica* from Mozambique and Guinea to determine its suitability for commercial pulping. The investigations deal with the dimensions of the fibres, the chemical properties of the sawdust and of pulps, and the physical and mechanical properties of the pulps. It is concluded that pulps from these African Bamboos have properties equal or superior to Indian Bamboo pulps, but more data is needed before they can be recommended for commercial production.

2204. ALLOUARD, P. Les conditions d'utilisation des bois feuillus dans la papeterie en France. **[The conditions for the use of hardwoods for paper-making in France.]** *Rev. for. franç.* 7 (9/10; 11), 1955 (661–74; 761–70). [F.]

Discusses the difficulties involved in the large-scale use of hardwoods for paper-making, the necessity for adequate inventories of the accessible supplies and for keeping in touch with the results of research, and the probable repercussions on silvicultural practices.

2205. ADAMIK, K. J. **The use of *Ailantus glandulosa* [*Ailanthus altissima*] as pulpwood.** *Tappi* 38 (9), 1955 (150*A*–153*A*). P.R.

Pulping tests were carried out with this species, which has been chosen for shelterbelts in the Burgenland (the easternmost part of Austria, with poor soil, similar to that in the adjacent Hungarian steppe). Alkaline or acid cooking gave high yields of pulp of good quality. It grows fast and is more easily barked than other hardwoods.

2206. ADAMIK, K. Der Götterbaum als Faserholz. **[*Ailanthus altissima* as pulpwood.]** *Zbl. ges. Forstw.* 74 (2), 1955 (86–94). [G.g.]

Contains data on mechanical properties, chemical composition and results of pulping tests, which were promising. [Cf. preceding abstract.]

2207. HRISTOV, C., and NEDELČEVA, M. Văzmožnosti za izpolzuvane na bukovata dărvesina kato surovina za celulozno-hartienata promišlenost. **[Beech wood as a potential raw material for the pulp and paper industry.]** *Nauč. Trud. lesoteh. Inst., Sofia* No. 3, 1954 (249–80). 24 refs. [Bulg.bulg.russ.]

Results of experimental (laboratory and industrial) sulphate cookings suggest the feasibility of using up to 35% Beech pulp with softwood pulp.

2208. BALCH, R. E. **Effects of Balsam woolly aphid on quality of pulp.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 11 (4), 1955 (1). 1 ref.

The salivary injections of *Adelges piceae* into the bark of Balsam Fir cause a stimulation of cambial activity and the production of an abnormal type of wood very similar to compression wood. The annual rings laid down during a period of moderately heavy infestation, before the tree is severely injured, are dark, hard, and brittle, especially in the more rapidly growing trees. Trees so affected are unsuitable for lumber owing to uneven shrinkage causing warping and splitting. The proportion of abnormal wood in some stands may also be sufficient to affect their value for pulp, owing to shortening of the tracheids and thickening of the cell walls. Bowater's Newfoundland Pulp and Paper Mills have made a study of the pulping qualities of wood from an infested stand. Tests indicated that pulp ground from this wood was short and brittle; 'burst' and 'tear' were low and the density of the wood was high. It was concluded that the pulp is definitely inferior to that from normal wood and too high a % should not be brought into the mill at one time. By proper mixing with normal wood, however, it should be possible to use all infested wood.

2209. STONE, J. E. **The rheology of cooked wood. I. Introduction and discussion. II. Effect of temperature.** *Tappi* 38 (8), 1955 (449–59). 23 refs. P.R.

Part I: Discusses the interrelationships between the degree of cooking, fiberizing energy, and rupture of the various layers of the cell wall. In Part II, results are presented of a study on the effect of temperature on (1) load to failure, (2) % deformation at failure, and (3) work to failure in Yellow Birch subjected to radial shear. The wood was heated either oven-dry in oil or swollen in $NaHCO_3$ solution, the temperatures ranging from room temperature up to 205° C. in the former and 185° in the latter case. Results indicate that, for oven-dry wood in oil, no strength is lost after the heated specimen has been cooled, but some is lost at higher temperatures. Values of (2) and (3) increase with temperature. Characteristic features of the curves obtained and results of the microscopic study are discussed.

2210. EBERHARDT, L. **New and revolutionary method for production of mechanical pulp. Groundwood from wood chips.** *Paper Tr. J.* 139 (37), 1955 (26–8). P.R.

Describes a new method which produces groundwood-type pulp by a gradual stepwise reduction of wood chips, utilizing the pressing action of the Pressafiner (initial pressing and fiberizing equipment), the attrition action of double-disc refiners, and the fibre selection of Bauer cleaners. The merits of the new method are discussed.

2211. RUSSELL, P. **Inactivation of phenyl mercuric acetate in groundwood pulp by a mercury-resistant strain of *Penicillium roqueforti* Thom.** *Nature, Lond.* 176 (4493), 1955 (1123–4). 3 refs. [Bowaters Development and Research Ltd., Central Research Laboratories, Northfleet, Kent.]

An investigation was begun in Dec. 1954 into the storage qualities of groundwood pulp impregnated with 25–35 p.p.m. of phenyl mercuric acetate (p.m.a.), compared with untreated pulp made at the same time. The evidence obtained shows that: (1) the strain of *P. roqueforti* normally present in Hg-treated pulp is able to absorb a relatively large amount of Hg from nutrient media containing p.m.a.; (2) progressive infection of groundwood pulp by this mould reduces concurrently the concentration of biologically active Hg to nil in the stained areas, without affecting the concentration of Hg determinable by chemical analysis; and (3) the loss of biologically active Hg in the pulp studied was followed by secondary infection by *Stereum sanguinolentum*, which caused a typical 'red

rot'. It is therefore suggested that *P. roqueforti* is able to render p.m.a. inactive as a fungicide, and hence reduce its value as a pulp preservative against secondary infection by wood-rotting fungi. It follows that more efficient protection against rot would be conferred by using either a non-mercurial toxicant, or a mixed toxicant containing a non-mercurial to which *P. roqueforti* is susceptible at concentrations lethal to basidiomycetes. [Cf. *For. Abstr.* 12 (No. 537); 16 (No. 2449).]

2212. HYTTINEN, A., and SCHAFER, E. R. **Grinding pretreated hardwoods: experiments on Quaking Aspen, Sweetgum, Red Alder, Black Tupelo, Sugar Maple, Red Oak and Cottonwood.** *Pulp Paper Mag. Can.* 56 (12), 1955 (140–8). 6 refs. [U.S. Forest Products Laboratory, Madison.]

Increasing the severity of the pretreatment with neutral Na_2SO_3 increased the strength and density of the pulp but decreased the brightness and opacity of its papers. The chemigroundwood pulp could probably be used for the same purposes as the neutral sulphite semichemical pulps. The darker pulps were easily brightened with $Ca(OCl)_2$. These chemigroundwood pulps may possibly provide entire or part substitutes for mechanical softwood pulps in newsprint and book and towelling papers, and also, in mixtures with mechanical hardwood pulps, a substitute for softwood groundwood. Details of the properties of the pulps, of test sheets, and of experiments in paper-making, are given for *Populus tremuloides*, *Liquidambar styraciflua*, *Alnus rubra*, *Nyssa sylvatica*, *Acer saccharum*, *Quercus* sp., and *Populus* sp. [Cf. *For. Abstr.* 12 (No. 3180).]

2213. FOOTE, W. J., and PARSONS, S. R. **Caustic treatment of Aspen groundwood.** *Pulp Paper Mag. Can.* 56 (12), 1955 (124–30). 6 refs.

Tabulates the effects of various cooking factors on the characters of the paper, describes a commercial operation and compares 100% Aspen with Spruce/Aspen groundwood pulp, concluding that the former (45% being treated with NaOH) is equal in quality to the mixed pulp. Other tests compare Aspen from 4 localities and the effect of varying wood moisture.

2214. HUSBAND, R. M. **Semichemical pulping of hardwoods with Na_2SO_3 and $NaHSO_3$. II.** *Tappi* 38 (10), 1955 (577–88). 12 refs. P.R.

[Cf. *For. Abstr.* 15 (No. 3048).] The process employs $NaHSO_3$ solutions buffered with pH 3·7–5·8 by the Na-acetate/acetic acid system. This buffer is created from the acetic acid derived from the wood together with a small amount of Na ion provided by $NaHSO_3$. It is shown that, at a liquor/wood ratio of 4·7/1, SO_2 in the amount of 5% of the weight of White Birch wood can remove 90% or more of the lignin removed by higher proportions of chemicals. It is also shown that semichemical pulps prepared from this species, digested at pH 4 with small amounts of $NaHSO_3$, are not weaker than Na_2SO_3 semichemical pulps prepared in the same yield from the same wood with much higher proportions of chemicals. *From authors' summary.*

2215. TACHI, I., KIMURA, Y., YASUDA, T., and TAMURA, T. **[Studies on pulp and paper-making. II. On the possibility of sulphate cooking of a softwood-hardwood mixture.]** *Wood Res. Kyoto* No. 12, 1954 (23–30). 6 refs. [Jap.jap.e.]

Since the maximum strength of pulp is attained at different lignin contents (10% for softwoods, and 2% for hardwoods), sulphate cooking of a softwood/hardwood mixture does not seem advisable.

2216. SMOLDERS, P. M. **The pulping of straw and hardwood with magnesium monosulphite.** Thesis, Technical University of Delft. 1954. pp. 91 + 1 photo. Many refs. [E.e.du.] P.R.

$MgSO_3$ has been found to be a suitable agent for the sulphite cooking of compound semichemical pulps from Poplar and Birch wood.

2217. STONE, J. E. **A study of the lignin removed during a neutral sulphite cook of Aspen.** *Tappi* 38 (10), 1955 (610–2). 6 refs. P.R.

The ratio of vanillin (*A*) and syringaldehyde (*B*) obtained by oxidation of cooking liquors was found to change continually during the cook. The yield of *B* was zero at the start of the cook, but increased until the final liquor yielded twice as much *B* as *A*. When calculated as a % of the lignin in liquor, the yield of *A* was almost constant throughout the cook, while that of *B* continually increased. *From author's summary.*

2218. KVASNICKA, E. A., and MCLAUGHLIN, R. R. **Extractable components of sulphite waste liquor.** *Pulp Paper Mag. Can.* 56 (10), 1955 (125–7). 1 ref.

Extraction by organic solvents does not preclude further treatment by fermentation, oxidation etc., and yields about 1·4–1·8g./ litre of lignin degradation products and extraneous wood components, some of which may be valuable for synthetic or pharmaceutical purposes. When all the main components have been identified, practical application of the method may be expected. Products so far identified are discussed.

2219. HAMILTON, A. D., and JONES, D. **The use of water resources and pollution control.** *Pulp Paper Mag. Can.* 56 (10), 1955 (99–102).

Report to the second Ontario Industrial Waste Conference on the steps being taken to conserve water and reduce pollution, sponsored by the Pollution Control Board of Ontario. Outlines the present control in wood preparation, mechanical and chemical pulp production and paper manufacture.

862. Composite Materials made Wholly or Partly of Woody Matter

See also Nos. 1958, 2066.

2220. CLARK, J. D'A., and MOTTET, A. L. (to the Long-Bell Lumber Co.). **Method and apparatus for preparing crosscut fibre.** *U.S. Patent* No. 2,689,092, Sept. 14, 1954. pp. 9 + 9 dgms. 23 refs. P.O.

Preparation of cross-cut fibres by cutting wood materials across the grain, the product being specially suited for the manufacture of fibrous products of density > 0·5 g./c.c.

2221. CLARK, J. D'A. **A new dry process multiply board.** *For. Prod. J.* 5 (4), 1955 (209–13).

Describes a new dry process for making composite board from whole cross-cut 'wafers' with tapered ends. It is possible to make core stock with a modulus of rupture > 3000 lb./sq. in. at 0·65 g./c.c., density, using < 1·5% of phenolic resin. The whole manufacturing process has been fully automatized.

2222. KOLLMANN, F. Herstellung und Eigenschaften dreischichtiger Holzspanplatten nach Rottmann. **[Manufacture and properties of three-layer chipboards made by Messrs. Rottman.]** *Holz Roh- u. Werkstoff* 13 (2), 1955 (57–63). 1 ref. [G.g.] P.R.

2223. STEMSRUD, F. Eine orientierende Untersuchung, wie die norwegische Birke sich als Rohstoff für Holzspanplatten zur Möbelherstellung eignet. **[A preliminary investigation on the suitability of Norwegian Birch for chipboards for furniture manufacture.]** *Norsk Skogind.* 9 (11), 1955 (417–29). [G.nor.] P.R.

Preliminary experiments at Brunswick, using freshly-felled *Betula pubescens* from Norway (diameter after barking 8–13 cm.) showed that: (1) strength of boards made from chips 0·2 and 0·4 mm. thick was satisfactory in boards with density ⩾ 0·6 g./c.c.; the surface appearance and uneven cross-sections of boards from the thicker chips were, however, unsatisfactory; (2) physical properties of the boards improved with increasing amounts of binder used in the range tested (5–14% by weight); 5% binder gave unsatisfactory results, but boards made with 8% binder had adequate properties; (3) the addition to the binder of paraffin emulsion reduced swelling in boards made from 0·2-mm. chips without reducing their strength properties to an unacceptable level.

2224. PEEL, J. D. **Resin-bonded chipboard from Malayan woods.** *Malay. For.* 18 (4), 1955 (204–5).

Experiments have been made in the manufacture of resin-bonded chipboard from: *Shorea leprosula* (normal wood and spongy heart) alone and in mixture with *S. guiso*; *Koompassia malaccensis*; *Dipterocarpus* spp.; and *Hevea* wood alone or in mixture. All boards had satisfactory strength, but the presence of *Hevea* wood causes high water absorption.

2225. NOWAK, A. **Changes in ligno-cellulose under heat treatment and pH control with special regard to the production of fibre sheets.** Forest Products Research Laboratory, Princes Risborough. [1955]. pp. 16 + 11 gphs. 4 refs. Transl. from *Holz Roh- u. Werkstoff* 12 (11), 1954 (427–34). [See *For. Abstr.* 16 (No. 3578).] P.R.

2226. BRUK, A. S. Gidrofobnye veščestva dlja prokleĭki drevesnovoloknistyh plit. **[Water-repellent substances for the impregnation of fibreboards.]** *Derev. lesohim. Prom.* 2 (12), 1953 (19–20). [Russ.] From *abstr.* in *Referat. Ž.* (*Him.*) 1955 (No. 33319). [Russ.]. P.O.

Describes the use of ozokerite or petrolatum as a substitute for paraffin wax. The substance is first melted and then emulsified with oleic acid in warm aqueous NH_3 solution.

2227. ERICKS, W. P. (to The Upson Company). **Impregnated fibrous wallboard and method of making.** *U.S. Patent* No. 2,629,648, Feb. 24, 1953. pp. 6. 7 refs. P.O.

The boards, consisting mainly of felted cellulose pulp fibres, are stabilized dimensionally by impregnation with 1–50% of at least one polycarboxylic acid in solution in a volatile hydrophilic solvent, and drying.

2228. ERICKS, W. P. (to The Upson Company). **Method for treating cellulose and product thereof.** *U.S. Patent* No. 2,629,674, Feb. 24, 1953. pp. 8. 6 refs. P.O.

[Cf. preceding abstract.] The polycarboxylic acids may be replaced by polyvalent alcohols dissolved in water, low alcohols or ketones, with or without propanol.

2229. NARAYANAMURTI, D., and SINGH, H. **Studies on building board: part IX—utilization of wood waste, tree barks and other lignocellulosic materials as a source of plastics and building boards.** *Comp. Wood* 2 (3), 1955 (53–62). 1 ref. P.R.

[Cf. *For. Abstr.* 16 (No. 2469).] Reports further work on the following materials: bark of *Shorea robusta*, *Holoptelea integrifolia* and *Alnus nitida*, Areca nut husks, Pine needles, coconut shells etc.

2230. STRÖMQVIST, E. Sätt att framställa byggnadsblock, plattor och dylikt samt sålunda framställda föremål. **[Method of making building blocks, boards etc., and the objects thus made.]** *Swedish Patent* No. 138,262, Nov. 25, 1952. pp. 2 + 2 dgms. [Sw.] P.O.

Wood wool is treated with a solution to soften the fibres, washed and dried (avoiding shrinkage), and mixed with cement to form panels or blocks.

863. Wood Hydrolysis. Saccharification

2231. FARBER, E. (to Timber Engineering Company). **Treatment of wood waste.** *Canadian Patent* No. 480,937, Feb. 5, 1952. pp. 5. P.O.

Comminuted wood is impregnated with a 2–10% aqueous solution of a mineral acid, dried, and then heated at low pressure to 130–270° C. until a considerable proportion of the wood cellulose is transformed into a lignin-like mass, to be used as soil improver.

864. Utilization of Lignin

See also No. 2198.

2232. HARRIS, E. E. **Chemical research on the utilization of lignin.** *For. Prod. J.* 5 (5), 1955 (345–51). 52 refs.

A review of work done in different countries since ca. 1930.

2233. KRATZL, K., and STEPNICKA, H. Über Kationenaustauscher auf Holzbasis. **[Cation exchangers based on wood.]** *Mitt. öst. Ges. Holzforsch.* 7 (4; 6), 1955 (51–5; 93–7). 42 refs. [G.g.] P.R.

It was found that, by treating wood in chip form or acid lignins with solutions of sulphites, cation

exchangers are obtained. The exchange capacity of sulphitized wood amounts to $\frac{1}{7}$–$\frac{1}{8}$, and that of the sulphitized HCl-lignin to just over $\frac{1}{2}$, of the exchange capacity (on weight basis) of the best commercial synthetic-resin cation exchangers. In order to obtain a high capacity for a moderate consumption of chemicals, the use of concentrated sulphite solutions of pH 6 is recommended, the sulphite being not less than 25% of the wood weight. Experiments with sulphitized wood in a water-softening plant gave very good results. The main disadvantage of the new exchangers is their bulkiness and low mechanical resistance.

865. Plastics

See also No. 2198.

2234. ESTERER, A. K. **Whole wood as a potential source for shaped articles.** *For. Prod. J.* 5 (5), 1955 (352–5). 34 refs.

Discusses the commercial importance of a potential process for manufacturing shaped articles from whole wood substance. Review of recent literature points to the conclusion that a re-forming of whole wood under heat and pressure is accomplished by a reconstitution of fragments cleft from whole wood at various temperatures. *From author's summary.*

2235. ROBERTS, J. R. (to Weyerhaeuser Timber Co.). **Moldable cellulose composition containing Pine wood resin, and molded product made therefrom.** *U.S. Patent* No. 2,714,072, July 26, 1955. pp. 4. 2 refs. P.O.

Example: defibrated lignocellulose and 20–40% (dry-weight basis) of thermoplastic Pine-wood resin (properties specified) are mixed and subjected to heat and pressure.

2236. NARAYANAMURTI, D., and SINGH, H. **The use of indigenous agricultural lignocellulosic wastes and acid hydrolysed materials as fillers for phenolic plastics.** *Comp. Wood* 2 (4), 1955 (87–91). 3 refs. P.R.

Includes tabulated results of tests on properties of boards moulded from phenolic plastics with fillers made of unhydrolysed or hydrolysed bark of *Shorea robusta* or *Holoptelea integrifolia*. The lignocellulosic residues obtained by acid digestion can be used to replace wood-flour as filler; the hydrolysed materials have a lower water absorption and fairly good strength properties.

866. Utilization of Wood Extractives

See also No. 1754.

2237. ČUDINOV, V. I. Batareĭno-protivotočnyĭ sposob ekstrakcii kanifoli. **[The battery-counter-current method of rosin extraction [from stumpwood].]** *Gidrol. lesohim. Prom.* 8 (1), 1955 (16–7). [Russ.] P.R.

Describes the method, which in Russia has proved to be more economical and to give better yields than the so-called dephlegmation method.

2238. KNICHALIK, P. (to AB Öfvergård & Co.). **Sätt att utvinna hartser ur hartshaltiga träslag genom** växelvisa tryckvariationer i en extraktionsbehållare. **[Removing resins from wood of high resin content by alternating pressure variation in an extractor.]** *Swedish Patent* No. 148,756, Feb. 8, 1955. pp. 2 + 2 dgms. [Sw.] P.O.

For completer extraction, alternating pressure variations between high vacuum and atmospheric (or additional) pressure are applied. To attain a higher pressure, a volatile solvent (e.g. turpentine oil) is added to the extraction vessel with the wood charge.

2239. KRITCHEVSKY, G., and ANDERSON, A. B. **Composition of the volatile oil from *Chamaecyparis lawsoniana* stump heartwood.** *J. Amer. pharm. Ass. (sci. Ed.)* 54 (9), 1955 (535–8). 10 refs. O.R.S.

2240. CALLOUD, H. Le tanin du châtaignier en France. **[Production of tannin from Chestnut wood in France.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/16-B*, 1955. pp. 2. [F.] Limited distribution.

867. Destructive Distillation

2241. FEOFILOV, V. V., SNESAREV, K. A., PERŠANOVA, M. G., and FILONENKO, JA. R. Izmel'čenie kak sposob povyšenija polnodrevesnosti lesorubočnyh ostatkov. **[Comminution as a method of increasing the bulk density of logging waste.]** *Gidrol. lesohim. Prom.* 8 (1), 1955 (6–7). [Russ.russ.] P.R.

An empirical formula $d_0 = 398/l^{0.273}$ has been developed for the relationship between the bulk density d_0 (kg./cu.m.) and the length l (cm.) of logging waste. Sufficient bulk density of hardwood logging waste for destructive distillation purposes can be obtained if l lies within the range 5 to 15 cm.

2242. KORJAKIN, V. I. Termičeskoe razloženie drevesiny v opytnoĭ vertikaljnoĭ nepreryvno deĭstvujuščeĭ peči. **[Thermal decomposition of wood in an experimental vertical, continuous-operation kiln.]** *Gidrol. lesohim. Prom.* 8 (1), 1955 (8–10). [Russ. russ.] P.R.

Illustrated description of the design and operation of a new continuous-operation kiln in which the non-condensable gaseous distillation products are heated in a calorifier (to 360–700° C.) and then introduced into the kiln (internal-heating principle) some of the cold gaseous products being used for cooling the charcoal. The merits of the new plant are discussed.

2243. SYRKINA, K. D. **Results of initial tests of first industrial plant for using wood for power and chemical purposes in combination.** In A. A. Kanaev, *Topočnye Ustroĭstva*, Mašgiz. 1954. pp. 76–102. [Russ.] From *abstr.* in *Fuel Abstr.* 18 (3), 1955 (No. 2425). P.R.

An illustrated description and operating results are given for a plant in which 3½ tons/hour of waste wood are distilled in the upper part of a shaft and the charcoal burned below. Some of the volatile products pass through a vertical grate of water tubes to heat a water-tube boiler and some travel

upwards and into a plant for separation into acid, tar and gas. The flue gases from the boiler are used for pre-drying the wood. Satisfactory operation was achieved, though the chemical side needed further development.

2244. Terzibašjjan, G. G. Novaja gazogeneratornaja ustanovka ZIS-352T dlja traktora KT-12. **[The new ZIS-352T gas-producer unit for the KT-12 tractor.]** *Lesn. Prom.* 14 (4), 1954 (7–10). [Russ.] L.S.

Illustrated description of the design and operation of a gas-producer suitable for wood blocks of 7 × 6 × 5 cm. with a moisture content not exceeding 25% absolute [i.e. based on green weight].

2245. Nomura, I. **[Studies on the market structure of charcoal in Japan.]** *For.* [*industr.*] *Econ., Tokyo* 8 (5; 6), 1955 (1–18; 1–22). 30 refs. [Jap.]

A detailed examination of the post-war position—the causes of current high prices, factors of supply and demand, with data by Prefectures for 1952, and a detailed analysis of the wholesale and retail market in Tokyo. The problems of forming a national marketing organization, transport by co-operatives and control of charcoal quality are discussed.

2246. Tanaka, K., and Tachi, I. **[Studies on active carbon. II. Preparation of active carbon in steam and in a furnace with admission of air.]** *Wood Res., Kyoto* No. 12, 1954 (1–8). 7 refs. [Jap.e.]

[Cf. *For. Abstr.* 15 (No. 4361).] Describes a method of activating charcoal by burning wood in an atmosphere of steam at 850° C. Another method consists in burning the wood in a furnace with admission of air; sawdust was soaked for 2–3 days in a saturated borax/H_3BO_3 solution and, after separation of the liquid, it was charred in unglazed porcelain vessels at 850° with admission of air. Properties of the active charcoal obtained are graphed and tabulated [no English captions]. The species used were: *Pinus densiflora, Cryptomeria japonica, Chamaecyparis obtusa, Betula japonica, Cinnamomum camphora, Eucalyptus globulus* and *Edgeworthia papyrifera.*

2247. Horiuchi, S., and Sakai, K. **Activated carbon from White Birch.** *Japanese Patent* No. 4622/54, July 26, 1954. [Jap.] From *abstr.* in *Chem. Abstr.* 49 (15), 1955 (10612). P.R.

Wood in a retort is carbonized with occasional burning of fuel gases above the wood in air. This process is repeated until the carbonization of 5 layers is completed; the layers are then heated in the absence of air. The product has low decolorizing power, but high gas-absorption capacity.

2248. Copley Ltd. **Process for the manufacture of active carbon and active carbon obtained by this process.** *Brit. Patent* No. 730,686, May 25, 1955. pp. 2. P.O.

Wood in chip form is impregnated with 0·5–2% by weight of H_3PO_4, carbonized, treated with NH_3, and activated with water vapour.

89. Other ('Minor') Forest Products

892. Vegetable Products

See also No. 2347.

2249. Badhwar, R. L., Dey, A. C., and Ramaswami, S. **The role of minor forest products for the betterment of tribal and backward class people.** *Indian For.* 81 (11), 1955 (717–20).

Briefly surveys the principal minor forest products of India, the provinces or states in which they occur, and their social and economic importance.

2250. Estalella Ayxelá, T., and García Barceló, J. Contribución al estudio de posibles aprovechamientos del monte bajo o matorral. **[A study of the possible utilization of scrub or *matorral*.]** *Revista de Ciencia Aplicada, Madrid* 8 (Fasc. 5, No. 40), 1954 (426–36). 21 refs. [Span.] L.S.

Chemical analyses were made of samples collected from '*matorral*', consisting of a mixture of 5 species: *Quercus coccifera, Rosmarinus officinalis, Ulex europaeus, Thymus vulgaris, Buxus sempervirens* and *Erica multiflora.* With a view to discovering their possible utilization, experiments were carried out in saccharification, steam extraction, fermentation, furfural extraction and cellulose production. The results suggest that utilization of these species for purposes other than firewood is a distinct possibility.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 2229, 2236, 2240.

2251. Chang, Y.-P., and Mitchell, R. L. **Chemical composition of common North American pulpwood barks.** *Tappi* 38 (5), 1955 (315–20). 36 refs. P.R.

Tabulates the contents of the following chemical components in 9 softwood and 15 hardwood barks: ash, extractives, 'lignin', OCH_3 in 'lignin' and bark, and the amount of the reducing sugars produced from extractive-free bark by 72% H_2SO_4.

2252. Manolov, A. Dobivane na rastitelni dăbilni surovini ot smrăč i dăb. **[Vegetable tanning raw materials from Spruce and Oak.]** *Težka Promišlenost, Bulgaria* 2 (10), 1953 (43–53). [Bulg.] From *abstr.* in *Referat. Ž.* (*Him.*) 1955 (No. 30691). [Russ.] P.O.

Discusses the characteristics of *Picea abies* and *Quercus* sp. in Bulgaria as sources of tannins, and factors influencing the quality of the extract. In Bulgarian Oak the proportion of tannins varies from 5·48% (stem wood) to 7·44% (root wood).

2253. Rahim, M. S. **Vegetable tanning materials in Pakistan.** *Tanner, Bombay* 9 (7), 1954 (23–7); 9 (8; 9), 1955 (13–6; 15–7). L.S.

The article deals chiefly with Goran (*Ceriops roxburghiana*), a Mangrove growing in abundance in the Sundarban forests (and other parts). The bark, which is mostly stripped from fuel logs, is not very popular because of the dark colour produced, its astringency, and high salt content, but improvement of quality through direct collection and correct drying should be possible, and its use in

mixture with other tanstuffs is recommended. Its high tannin content (up to 38%) would make it a suitable basis for tannin-extract manufacture. The spent bark could be used as fuel, after drying. Its calorific value is claimed to be half that of coal. Colour would again present a problem, though not an insuperable one. Other species discussed, frequently with an analysis of their tannin content, are *Rhizophora mucronata, Bruguiera gymnorrhiza, Acacia arabica, Terminalia chebula* and *T. arjuna, Carapa obovata, C. moluccensis, Cassia fistula, Heritiera minor, Sonneratia apetala, S. acida*, and one or two species considered unsuitable.

2254. RAHMAN, M. B. **Mangrove bark—a potential source of tanning material.** *Pakistan J. For.* 5 (3), 1955 (183–8). 7 refs.

A general account with particular reference to *Ceriops roxburghiana* and its possible exploitation in Pakistan.

2255. WISSING, A. **The utilization of bark. II. Investigation of the stiasny reaction for the precipitation of polyphenols in Pine bark extractives [using a commercial Swedish Pine bark tanning extract].** *Svensk PappTidn.* 58 (20), 1955 (745–50). 9 refs. [E.] P.R.

2256. YAGÜE GIL, A., and TORNER OCHOA, J. La gayuba como material curtiente. [***Arctostaphylos uva-ursi* as a tanning material.**] [*Bol.*] *Inst. for. Invest Exp. Madrid* 26 (74), 1955. pp. 32 + 2 plates. 14 refs. [Span.span.e.g.f.]

A study was made of the possible utilization of this shrub, which is widespread on the mountains in Spain and is apt to impede natural regeneration in Pine stands. Data from analyses of the foliage are presented along with the results of some practical trials. It can be usefully employed for tanning when added to other chemicals, but cannot be used alone. *From authors' summary.*

2257. KURTH, E. F., RAMANATHAN, V., and VENKATARAMAN, K. **The colouring matters of Ponderosa Pine bark.** *Curr. Sci.* 24 (5), 1955 (157). 5 refs. A.P.B.

A chemical analysis. [Cf. *For. Abstr.* 16 (No. 4790).]

2258. BRIGGS, L. H., and TAYLOR, A. R. **Chemistry of the *Coprosma* genus. Part X. The colouring matters from [root-bark of] *Coprosma rhamnoides*.** *J. chem. Soc.* Sept., 1955 (3298–9). [Auckland University College, Auckland, New Zealand.] O.R.S.

2259. PAVANARAM, S. K., and RAMACHANDRA ROW, L. **New flavones from [root bark of] *Pongamia pinnata* (L.) Merr.: identification of Compound D.** *Nature, Lond.* 176 (4494), 1955 (1177). 4 refs.

Cf. *For. Abstr.* 14 (No. 2897).

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

See also No. 1295.

2260. CORRELL, D. S., SCHUBERT, B. G., GENTRY, H. S., and HAWLEY, W. O. **The search for plant precursors of cortisone.** *Econ. Bot.* 9 (4), 1955 (307–75). 60 refs. [Horticultural Crops Research Branch, U.S.D.A.]

Describes the collecting in America and Africa of *Strophanthus, Agave* and *Dioscorea* material and the cultivation of these plants, particularly the last, now considered the most abundant plant source known.

2261. BISSET, N. G. **The steroid glycosides of the Apocynaceae. Part II.** *Madj. Ilmu Al. unt. Indones.* 111 (1/3), 1955 (76–117). 3 pp. of refs. [E.e.] E.M.B.

Covers the chemistry of the steroid aglycones and glycosides and includes a supplement to Part I [see *For. Abstr.* 15 (No. 4375)].

2262. CHAKRAVARTI, D., CHAKRAVARTI, R. N., and GHOSE, R. **Chemical examination of Dita bark.** *Bulletin, Calcutta School [of] Tropical Medicine* 1 (4), 1954 (6–7). From *abstr.* in *Chem. Abstr.* 49 (18), 1955 (12771). P.R.

Bark of *Alstonia scholaris* is of value as a febrifuge. Describes extraction procedures preliminary to the isolation of the active principle.

2263. CROW, W. D., and GREET, Y. M. **The occurrence of reserpine in [root-bark of] *Alstonia constricta* F. Muell.** *Aust. J. Chem.* 8 (3), 1955 (461–3). 7 refs. [Division of Industrial Chemistry, C.S.I.R.O., Melbourne.] O.R.S.

2264. TSCHESCHE, R., and PETERSEN, R. Die Trennung der Alkaloide der Kurchirinde (*Holarrhena antidysenterica*) mit Hilfe chromatographischer Verfahren. **[Separation of *H. antidysenterica* alkaloids by chromatography.]** *Chem. Ber.* 87 (11), 1954 (1719–25). 11 refs. [G.g.] P.R.

2265. DUBOIS, L. ***Tabernanthe iboga* Baillon.** *Bull. agric. Congo belge* 46 (4), 1955 (807–29). 35 refs. [F. flem.]

Contains a descriptive list of the 6 known species of this exclusively African genus. Most widespread of these is *T. iboga*, the roots of which are at present the only proved source of the alkaloid ibogaïne, which has tonic effects on heart, nerve, muscle and appetite. Total alkaloids are about ⅓ those of *Rauwolfia vomitoria* but the abundance of plants warrants further study for possible trade.

2266. LA BARRE, J., and GILLO, L. À propos de l'action cardiotonique et de la toxicité de deux alcoloïdes extraits du *Voacangua africana*. **[The cardiotonic action and the toxicity of two alkaloids extracted from *V. africana*.]** *C.R. Soc. Biol., Paris* 149 (9/10), 1955 (1075–7). 1 ref. [F.] O.R.S.

2267. COMIN, J., and DEULOFEU, V. **Studies on Argentina plants. XIV. N-methylisocorydine, quaternary alkaloid from the bark of *Fagara coco* (Gill.) Engl.** *Journal of Organic Chemistry, Baltimore* 19, 1954 (1774–9). 17 refs. O.R.S.

2268. GELL, R. J., HUGHES, G. K., and RITCHIE, E. **The chemical constituents of Australian *Flindersia* species. VIII. The structure of maculine [isolated from the bark of *F. maculosa*].** *Aust. J.*

Chem. 8 (3), 1955 (422–3). 3 refs. [University of Sydney.] O.R.S.

2269. CHATTERJEE, A., and CHOUDHURY, A. **The structure of marmin, a new coumarin of *Aegle marmelos* Correa.** *Naturwissenschaften* 42 (18), 1955 (512). 1 ref. [E.] [University College of Science, Calcutta.] O.R.S.

2270. CHUN YU LIN, R. **Presence of acetylcholine in the Malayan Jack-fruit, *Artocarpus integra*.** *British Journal of Pharmacology, London* 10 (2), 1955 (247–53). 11 refs. L.S.

The pharmacologically determined acetylcholine content was 564 μg./g., 300 μg./g., and 60 μg./g. in seeds, midribs of leaves, and whole leaves respectively.

2271. THAMACHARI, B. **[The extraction of the active principle from *Dichroa febrifuga*.]** *Vanasarn* 12 (4), 1954 (25–9). 3 refs. [Siam.e.]

Report on the extraction and analysis of the alkaloid, febrifugine, from the roots of specimens collected in rain-forest valleys. The leaves contained only traces of the alkaloid.

2272. CARR, W. R. **Ascorbic acid content of Baobab [*Adansonia digitata*] fruit.** *Nature, Lond.* 176 (4496), 1955 (1272–3). 4 refs. [Government Analyst's Laboratory, Salisbury, S. Rhodesia.]

Analysis confirmed the view that this fruit is an important source of ascorbic acid.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 1605 *et seq.*, 2237–9, 2293.

2273. THAMACHARI, B. **[Kinds of gum.]** [*Bulletin*] *Royal Forest Department, Ministry of Agriculture, Bangkok* No. *R.*8, 1954. pp. 8. 4 refs. [Siam.]

A list, including true gums and also some oleoresins and hard resins, arranged alphabetically by trade names in English, followed by the scientific and local Siamese names of the plant and its source.

2274. GURIČ, N. A., and JASINSKIĬ, B. N. O transportirovke i hranenii živicy. **[Transport and storage of crude resin.]** *Gidrol. lesohim. Prom.* 8 (2), 1955 (8–9). [Russ.] P.R.

In addition to conventional wooden barrels, two types of iron container (barrels of 100 and 200 kg. capacity, and rectangular containers of ca. 1000 litres capacity) are described. The possibility of using railway tanks is also envisaged. Finally, the storage of resin in gasholder-type and other stationary storage containers is discussed.

2275. VASILEVSKIĬ, I. I. Vodnyĭ basseĭn dlja hranenija živicy v bočkah. **[Water pond for storing crude resin in barrels.]** *Gidrol. lesohim. Prom.* 8 (1), 1955 (18–9). [Russ.] P.R.

Describes a pond used since 1952 at a Kiev factory for storing crude resin in barrels (particularly during summer and autumn months), to prevent both turpentine loss and fire risk.

2276. MIROV, N. T., and ILOFF, P. M., JR. **Composition of gum turpentine of Pines. XXIV. A report on two Asiatic Pines: *Pinus armandi* and *P. bungeana*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 54 (7), 1955 (424–7). 7 refs. O.R.S.

Determines the composition of the two turpentines. That of *P. bungeana* is very much simpler than that of *P. armandi*, and differs from that of *P. gerardiana* in its almost complete absence of sesquiterpenes and the fact that its β-pinene is laevorotatory, though the two species are grouped together systematically.

2277. SCHEUBLE, R. Individuelle Konstanz der von Individuum zu Individuum stark variierenden Harzeigenschaften der Schwarz- und Weisskiefer. **[The constancy, for each individual, of resin properties varying considerably between individuals of Austrian and Scots Pine.]** *Mitt. forstl. VersAnst., Mariabrunn* No. 49, 1953 (5–45). 54 refs. [G.g.]

Experiments were carried out over 9 years on (*a*) 53 *Pinus nigra* var. *austriaca*, (*b*) 50 *P. sylvestris* and (*c*) one hybrid of these, all aged ca. 120–130 years. These confirmed observations made for other Pines that the optical rotation of turpentine oils derived from a particular tree varied little (only 2·5–3° against ca. 35° for population (*a*) and 49° for (*b*) in Na light). All of (*a*) rotated to the left, most of (*b*) to the right, while (*c*) rotated slightly, sometimes to the left and sometimes to the right. From the rotation dispersion for two lights of different colour, which was fairly constant for (*a*) and again for the dextro-rotatory Scots Pines, deductions were drawn as to the α- and β-pinene contents of the oils. Turpentine-oil content of the resins, collected in special closed flasks to prevent evaporation, varied between 29 and 35% for (*a*) and 32 and 40% for (*b*) but again was more constant for individuals, as was resin yield, though less markedly so owing to the many factors involved. Little correspondence was found between the many properties of turpentine oils derived from the resin, the needles, and the wood of branches or trunk in the individual tree. Implications for genetical and provenance research are discussed. [Cf. *For. Abstr.* 8 (No. 590).]

2278. BUKAŁA, M. Badania nad składem polskich terpentyn z *Pinus silvestris*. **[Investigations on the composition of Polish turpentines from *P. sylvestris*.]** *Prace wrocławskiego Towarzystwo Naukowego, Wrocław* 35*B*, 1952. pp. 85. 65 refs. [Pol.pol.] L.S.

Both the extraction and distillation turpentines are poor in pinene (not more than 60%), the former containing more than the latter. They contain large proportions of Δ^3-carene (up to 37·6%).

2279. WIDMARK, G. **Purification of *d*-limonene and β-pinene.** *Acta chem. scand.* 9 (6), 1955 (938–40). 4 refs. [E.e.] O.R.S.

Commercial samples of *d*-limonene and β-pinene were purified to index homogeneity. The former is compared with *l*-limonene isolated from turpentine from cones of *Abies alba*.

2280. SAMAPUDHI, K. **Yarng oil.** *Bulletin, Royal Forest Department, Ministry of Agriculture,*

Bangkok No. *R.*14, 1954. pp. 12 + 14 photos + 1 map. 10 refs. [E.e.]

Describes the qualities of the oil derived from *Dipterocarpus alatus* and *D. turbinatus*, the method of tapping (chemical stimulation proved less effective than the traditional use of fire) [cf. *For. Abstr.* 17 (No. 1614)], uses (manufacture of paint and varnish, caulking boats), and discusses the possibility of using it as fuel for diesel engines.

2281. SCHULTES, R. E. **Pitch-yielding trees of the Colombian Amazonia.** *Botanical Museum Leaflet, Harvard University, Cambridge, Mass.* 17 (1), 1955 (12–24 + 7 photos + 2 drawings).

An account of several resiniferous species and the use made by Indians of their resins, with botanical descriptions of new species and varieties: *Moronobea coccinea*, *M. riparia* var. *fimbrillata* var. nov., *Platonia insignis* var. *formosa* var. nov., *Symphonia globulifera*, *S. microphylla* sp. nov., and *S. utilissima* sp. nov.

2282. HORN, D. H. S., NUNN, J. R., and RIVETT, D. E. A. **Some constituents of the resin of *Euryops floribundus* N.E. Br.** *Journal of the South African Chemical Institute, Johannesburg* (*n.s.*) 7 (1), 1954 (22–7). 1 ref. L.S.

The resin contains free acids, most of which have been identified, esters, and traces of saturated long-chain hydrocarbons.

2283. KLIMEK, R. **Properties of essential oils from Polish plants.** *Roczniki Państwowego Zakładu Higieny, Warszawa* 2, 1951 (91–100). [Pol.f.] From *abstr.* in *Chem. Abstr.* 49 (15), 1955 (10588). P.R.

Gives the following data for the oil obtained from the twigs and needles of *Abies alba*: proportion of oil in the material, density, specific rotation, index of refraction, acid value, esterification value and acetyl value.

2284. ARCHER, E., and GAUTHIER, M. La mousse d'arbre. ['Tree-moss'.] *Bulletin Technique d'Information des Ingénieurs des Services Agricoles, Paris* No. 74, 1952 (713–20). [F.] C.G.B.

Describes the collection, transport and industrial uses of lichens growing in the Massif Central of France, chiefly *Evernia furfuracea*, *E. prunastri* and *Usnea barbata*, merchanted under that name. Some 700 tons are purchased annually by the perfume industry for their essential oil content. Their antibiotic properties are not sufficient for industrial exploitation.

2285. PANOUSE-PERRIN, J. Propos d'actualité sur les *Melaleuca*. [**News about *Melaleuca***.] *Bois For. Trop.* No. 43, 1955 (21–6). 10 refs. [F.e.span.]

A short account of the species of *Melaleuca* exploited for their essential oil, with suggestions for cultivating them in Africa.

2286. PENFOLD, A. R., and MORRISON, F. R. **Recent advances in our knowledge of Australian essential oils.** *Australasian Journal of Pharmacy, Melbourne* 33 (393), 1952 (851–2). N.C.L.

The most promising alternative source of methyl eugenol, the chief component of Huon Pine-wood oil, formerly obtained from the waste wood and shearings of *Dacrydium franklini*, is stated to be the oil from the leaves of *Melaleuca bracteata*, whose two physiological forms are also rich in methyl-isoeugenol and elemicin respectively. *Leptospermum citratum* and *Eucalyptus citriodora* and their physiological forms, as affecting oil composition, are also discussed.

2287. SCHEUER, P. J. **The constituents of Mokihana (*Pelea anisata* Mann).** *Chem. & Ind.* 1955 (40), (1257–8). 9 refs. P.R.

The chief constituent of the oil obtained by extraction from leaves, twigs and fruits was found to be anethole.

2288. DE SA, B. J., KANE, J. G., and REBELLO, D. **Refining of Karanja oil (from *Pongamia glabra*).** *J. sci. industr. Res., India* 14*B* (7), 1955 (358–9). 5 refs. D.S.I.R.

Describes its treatment with a dilute solution of NaOH in alcohol.

2289. MITRA, C. **A note on the chemical examination of the oil from *Calophyllum inophyllum* Linn.** *J. sci. industr. Res., India* 14*B* (9), 1955 (481–2). 2 refs. D.S.I.R.

A new highly unsaturated long-chain acid ('inophyllic' acid) has been detected in the oil from *C. inophyllum* nuts of Indian origin.

2290. GALLOTTI, A. M. PEREIRA. Umari (Nota prévia). [***Poraqueiba* spp. (Preliminary note).**] *Boletim do INT* 4 (10), 1953 (30–5). 10 refs. [Port.]

A description of the fruit of *P. paraensis* and *P. sericea*, and their chemical properties (particularly the oily constituents), with suggested uses.

2291. ROSENTHAL, F. R. T. A goma de catingueira. [**Gum of Catingueira (*Caesalpinia* sp.).**] *Boletim do INT* 4 (8), 1953 (30–9). 8 refs. [Port. port.]

Chemical and physical properties are described.

2292. ROSENTHAL, F. R. T. Estudos sôbre a constituição de algumas gomas nacionais. Nota prévia. [**The constitution of some native gums. Preliminary note.**] *Boletim do INT* 4 (9), 1953 (23–9). 4 refs. [Port.port.]

The study, part of a more extensive project, deals with the identification of the monosaccharides of hydrolysates from the gum of *Anacardium occidentale*, *Caesalpinia* sp. and *Piptadenia rigida*.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

See also Nos. 1472–3, 1475, 1477, 1582, 1604, 2272, 2289–90.

2293. BAINS, G. S., BHATIA, D. S., and ANANDASWAMY, B. **Studies on the seeds of *Caesalpinia pulcherrima*, Linn. with special reference to the mucilage.** *Journal of the Indian Chemical Society, Calcutta* (*Industrial & News Edition*) 17 (3/4), 1954 (187–92). 17 refs. L.S.

The mucilage was found to be a galacto-mannan polysaccharide.

2294. RAO, M. V. L., SUBRAMANIAN, N., and SRINIVASAN, M. **Nutritive value of Bamboo seeds (*Bambusa arundinacea*, Willd.).** *Curr. Sci.* 24 (5), 1955 (157–8). 7 refs. A.P.B.

Analysis of the seeds and tests of their nutritive value showed that the biological value of the seed proteins is as high as that of rice proteins and higher than that of wheat proteins. In protein content the seeds are comparable with wheat and superior to rice.

2295. SAVUR, G. R. **Tamarind seed polysaccharides.** *Curr. Sci.* 24 (7), 1955 (235–6). 7 refs. A.P.B.

Tamarind kernel powder contains 3 distinct types of polyose fraction which differ in their solubility and power of gelatinization and have been designated P_1, P_2 and P_3. A mixture of P_2 and P_3 can be used extensively in the textile and food industries.

2296. **Industrial fibres: a review of production, trade and consumption relating to cotton, wool, silk, flax, jute, sisal and other hemps, mohair, coir, kapok, rayon and other man-made fibres.** H.M. Stationery Office, London 1955. pp. iv + 184. Price 5*s*.

Compiled in the Intelligence Branch of the Commonwealth Economic Committee. The 131 tables include data for each class of fibre by countries, as well as figures of world production, and cover 1938–39 and 1949–54.

893. Animal Products

2297. **[Commercial lac cultivation in Thailand.]** [*Bulletin*], *Royal Forest Department, Ministry of Agriculture, Bangkok* No. *R.*12, 1953. pp. 30. [Siam.]

A lecture given by the Director-General of Forests to the Committee on Forest Management. The importance of lac exports to Thailand's economy is stressed, the average for the 5 years before World War II amounting to nearly 6,591,000 kg. p.a. and for the 5 years from 1947 to nearly 4,568,000 kg., and the main producing provinces (15, in the N., N.E., and centre of the country) are named. The chief trees on which lac is cultivated are *Swietenia mahagoni*, *Albizzia lucida*, *Pterocarpus indicus*, *Dalbergia* spp., and *Cajanus indicus*, but trials at Sithan Experimental Station indicate that other species, e.g. *Xylia dolabriformis*, *Zizyphus jujuba*, and *Grewia paniculata*, are also promising hosts. Details of lac cultivation and some account of experimental stations (existing and planned) and experiments at Sithan are also given, with illustrations of pruned and unpruned host stands.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. General

2298. **Forest policy—national progress reports.** [*Docum.*] *8th Sess. FAO European For. Comm., Rome 1955* Nos. *FAO/EFC*/81-*A*...*Q*, 1955. [E. or F.] Limited distribution.

(*A–E*): Austria (pp. 7), Netherlands (pp. 5), France (pp. 18); Denmark (pp. 3), Norway (pp. 5).

(*H–J*): W. Germany (pp. 7), Switzerland (pp. 9), Finland (pp. 11).

(*L–N*): Turkey (pp. 18), Jugoslavia (pp. 4), Greece (pp. 2).

(*P–Q*): Portugal (pp. 22), Great Britain—with N. Ireland and Cyprus (pp. 23).

2299. **Forest policy reports.** [*Docum.*] *1st Sess. FAO Near East For. Comm., Teheran 1955* Nos. *FAO/NEFC*/13-*E* to *K*, 1955. [E. or F.] Limited distribution.

Cyprus (pp. 12 + 10 tbls.), Syria (pp. 5), Lebanon (pp. 3), Abyssinia (pp. 8), Jordan (pp. 4), Iraq (including text of new Forest Law) (pp. 16), and Sudan (pp. 20).

2300. **Thailand: FAO progress report in forestry 1952–1954.** [*Docum.*] *3rd Sess. FAO Asia Pacif. For. Comm. 1955* No. *FAO/APFC* 55/20, 1954. pp. 31.

Report by the Royal Forest Department, Bangkok. [Cf. *For. Abstr.* 17 (No. 2318).]

2301. Rapport sur la gestion de la forêt au Viet-Nam pendant l'année 1953. **[Progress report on forestry in Viet-nam during 1953.]** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/22, 1955. pp. 11 + 2. [F.]

Includes notes on work in progress at 4 research stations, and tabulated data on the principal timbers.

2302. Rapport sur la gestion de la forêt au royaume du Laos. **[Progress report on forestry in Laos.]** [*Docum.*] *3rd Sess. FAO/Asia-Pacif. For. Comm. Tokyo* No. *FAO/APFC*-55/15, 1955. pp. 7. [F.] Limited distribution.

2303. Rapport sur les progrès réalisés en matière forestière au cours de la période Juillet 1952–Juillet 1954. **[Progress report on forestry in Cambodia July 1952–July 1954.]** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/10, 1955. pp. 19. [F.]

Preparations are being made for an aerial survey of the forests; a pilot experiment in mechanical logging and sawmilling has been instituted at Santuc—first results were rather disappointing.

2304. REISSER, A. Die Forst- und Holzwirtschaft Belgisch-Kongos. **[Forestry and the timber industry in the Belgian Congo.]** *Z. Weltforstw.* 18 (2), 1955 (50–6). 19 refs. [G.e.f.]

An account of the natural forest resources of the colony, their administration, exploitation and planned development, with statistics on the export of round and sawn timber and of plywood and a table listing 32 export timbers with botanical, trade and native names, habitats, properties, uses etc.

902. History of Forests and Forestry

See also Nos. 1299, 1421, 1667, 2313.

2305. GUINIER, P. Les paysages végétaux des plateaux calcaires de l'est du Bassin parisien (forêts et friches). (Botanique, foresterie, économie rurale). **[Aspects of the vegetation of the calcareous tablelands of the eastern part of the Parisian basin (forests and clearings). (Botany, forestry, rural economy.)]** *Bull. Soc. bot. France* 102 (Spec. No.), 1955 (31–46 + 1 plate). [F.] O.B.D.

Surveys the history of the forests, their past management as coppice with standards, and the ecological and floristic changes brought about by this system. Their gradual conversion to high forest began in the middle of the 19th century. Notes are also presented on the ecology of the forest areas cleared for pasture, and on the artificial stands of this region.

2306. LATHAM, B. **The growth of the timber industry in Canada. Quebec.** *Wood* 20 (12), 1955 (486–8). 1 ref.

By 1825 Quebec had become the largest timber port the world had ever known. Tables give details of the lumber establishments there, and the more important sawmills in lower Canada in 1835. Contemporary extraction methods are sketched and the history of the foundation of the forest department and initial forest legislation outlined.

903. Forest Policy, General

See also No. 2315.

2307. F.A.O. ormancılık politikası semineri Istanbul, 13–25 Eylül 1954. **[F.A.O. forest policy seminar, Istanbul; 13–25 September 1954.]** *Istanbul Üniv. Yay.* No. 617 (*Orm. Fak.* No. 30) 1955. pp. 52. [Turk.E.]

Contains the text of two addresses by F. Heske.

2308. DUSCHEK, S. Aktuelle Probleme der österreichischen Forst- und Holzwirtschaft. **[Present-day problems of Austria's forestry and timber economy.]** *Öst. Vjschr. Forstw.* 96 (2), 1955 (69–83). 8 refs. [G.]

Discusses Austrian forestry and timber statistics and the assumptions and estimates underlying them and proposes, *inter alia*, as short-, middle-, and long-term remedies of the supply position: heavier thinnings, particularly in unmanaged small peasant holdings, Poplar planting on riverain sites, and reforestation, chiefly near the timberline.

2309. WINTERS, R. K. **Forestry and technical assistance in Pakistan: a sample of co-operative effort through national, bilateral, and international programs.** *Unasyla* 9 (3), 1955 (117–23).

Describes the forests of Pakistan, their administration, and the Technical Aid Programme (including introduction of equipment, and establishment of the Forest Research Laboratory, Chittagong).

2310. **[Outline of forest policy regarding protection of forests and prevention of forest offences: [submitted to the committee on protection and control of public forests by Nai Thiem Komkris, Director General of Forests].]** *Vanasarn* 12 (1), 1954 (21–45). [Siam.e.]

The outline is summarized under the main heads: (1) The nature of forest destruction; (2) The causes for country-wide destruction of the forest; (3) Means proposed for the prevention of forest destruction; (4) Means proposed for the suppression of forest destruction. Under (3), the measures include (*a*) speeding up forest reservation, so as to reach the target of 270,000 sq. km. as soon as possible; (*b*) speeding up the forest inventory and the working-plan programme, so that the timber trade can work to a known annual output (aerial photos of the whole country are expected to be ready soon); (*c*) amendment of certain sections of the Forest Law; (*d*) increase of forest staff (already sanctioned in respect of rangers) and reorganization of charges (Forest Divisions already increased from 12 to 21). Under (4), measures include heavier penalties for offences against the Forest Law, including confiscation of tools, animals and vehicles used in commission of an offence; closer cooperation of the administration and police with forest officials; and heavier penalties for corrupt government officials. [Cf. *For. Abstr.* 17 (No. 2318).]

2311. SUKSAWASDI, S. **[The future of Siamese Teak forests.]** *Vanasarn* 11 (2), 1953 (5–14). [Siam.e.]

The author, a veteran forester, deplores the drain on the country's Teak forests, as shown by the falling figures of production, points to the chief causes (uncontrolled forest clearance, both for shifting and permanent cultivation; fires, and illicit felling) and suggests remedies, starting with proper land classification and the speeding up of forest reservation.

2312. KENNEDY, H., CAMERON, D. R., and GOODYEAR, D. C. **Report of the Newfoundland Royal Commission on Forestry 1955.** Queen's Printer, Newfoundland. 1955. pp. 240 + 8 maps + 3 gphs.

The Royal Commission was appointed in 1954 to enquire into the forestry resources of the province. The report is divided into the following chapters: historical; general observations; the pulp and paper industry; taxation; labour; forest fire protection; insects and disease (by *R. E. Balch* and *W. J. Carroll*); growth; adequacy of pulpwood reserves in Newfoundland; the Third Mill problem (i.e. whether there is room for a pulp and paper mill in addition to those of A. N. D. Co. and Bowaters); the sawmilling and other wood-using industries; the Department of Mines and Resources; the Labrador; reforestation; forestry research; management; education; legislation; expenditures for forestry; miscellaneous.

The recommendations of the Commission, which are summarized at the beginning of the report (pp. 6–9) include the setting up of a body to be known as the Newfoundland Forest Protection Administration (N.F.P.A.), a body corporate to be administered by the Lieutenant-Governor-in-Council, consisting of a Chairman, who shall be the Minister of the Department of Government for the

time being in charge of forestry; a Vice-Chairman who shall be a representative of one of the two existing pulp and paper companies in the province; one member who shall be a representative of the other two companies; one member who shall be a representative of the sawmilling and other smaller timber interests; and one member who shall be the Director-General of N.F.P.A. (a full-time, paid employee, appointed by the Lieutenant-Governor-in-Council to be in immediate charge of forest protection for the province). Other recommendations are the setting up of a third mill, the renegotiation of existing agreements with the pulp companies, the establishment of a Newfoundland Forest Service not later than 1960, and substantial increases in federal grants for biological investigations and research in Newfoundland.

904. General Regional Accounts of Forests and Forestry

2313. DUSCHEK, S. Der Forstbezirk Murau, seine Geschichte und seine Forstwirtschaft. **[The Murau forest district, its history and forestry.]** *Öst. Vjschr. Forstw.* 96 (1), 1955 (38–46). [G.]

A lecture tracing the history of the region centring round the upper valley of the Mur in the north-eastern Central Alps, from charcoal burning for the local iron foundries to modern sawmilling and paper manufacture, and describing present stocking and management.

2314. ROL, R. La végétation forestière de la Corse. **[The forest vegetation of Corsica.]** *Rev. for. franç.* 7 (12), 1955 (841–52 + 8 photos). [F.]

A short account of the forests of Corsica and methods of management, particularly for resin tapping and cork production.

2315. Suomen puun miehiä. **[Finnish timber men.]** Kustannus Oy. Valioteos, Helsinki. 1954. pp. 337. [Fi.E.]

Includes the following papers: Features of the development of Finnish forest resources (*Y. Ilvessalo*); Main features of Finland's forest policy (*V. Holopainen*); Voluntary co-operation between private forest owners in Finland (*A. Piha*); Harvesting timber crops (*K. Putkisto*); The Finnish forest worker (*L. Heikinheimo*); Finland's mechanical woodworking industry (*M. Jalava*); Industry based on the manufacture and use of wood fibre in Finland (*H. Roschier*); Origin and development of sales organizations (*M. Valtasaari*); and Marketing areas of Finnish timber exports. There is also a directory (pp. 205–337) of research and administrative staff etc., in forestry and the woodworking industries, showing their present position, brief biographical particulars, selected published works etc.

2316. **Forestry of Japan.** Forestry Agency, Ministry of Agriculture and Forestry, Tokyo. 1955. pp. 219 + 1 map. [E.]

Includes the following sections: history; natural environment; forest resources and programme; reforestation; forest protection and game administration; conservation; production, standards and transport of forest products; timber industry; demand and supply; research and education; forest owners' organizations; labour; finance; and laws.

2317. JOLAIN, R. Le Japon forestier. **[Forests and forestry in Japan.]** *Rev. for. franç.* 7 (11), 1955 (749–58 + 2 photos). [F.]

2318. THIRAWAT, S. **Brief information on forestry situation in Thailand.** *Bulletin, Royal Forest Department, Ministry of Agriculture, Bangkok.* No. *R.*17, 1955. pp. 85 + map. [E.]

Contains chapters on climate, land classification, types and distribution of forests, national forest policy, forest organization, personnel, forestry education, forest reservation, forest legislation, and reserved timber species. [Cf. *For. Abstr.* 17 (Nos. 2300, 2310–11, 2335, 2347).]

2319. CHAPUIS, J. Les progrès forestiers dans la zone caraïbe. **[Progress in forestry in the Caribbean area.]** *Rev. for. franç.* 7 (13), 1955 (938–48 + 1 photo + 1 map). [F.]

A short general account, with a few figures for production and trade.

2320. Bericht über die Expedition in das Gebiet Carare. **[Report on the expedition [by the Instituto de Colonización e Inmigración] to the Carare region [, Colombia].]** *Int. Holzmarkt* 1954 (20), (4–9). [G.]

Includes climatic and geographic distribution, a list of species with an indication of their frequency and some data on supplies, and tools and equipment used in exploitation and conversion.

905. Forest Statistics and Resources

See also No. 1838.

2321. ILVESSALO, Y. Suomen metsävarat kolmen valtakunnan metsien arvionnin valossa 1921–24—1951–53: muutamia pääpiireteitä. **[The forest resources of Finland in the light of three national forest surveys in 1921–24—1951–53: some essential data.]** *Commun. Inst. for. Fenn.* 43 (4), 1954 (1955). pp. 10. [Fi.Sw.E.]

Presents statistical data in the form of 6 diagrams.

2322. Metsätilasto: kertomus metsähallinnon toiminnasta v 1953. **[Forest statistics: report on the activity of the [Finnish] State Board of Forestry in 1953.]** *Suomen Virallinen Tilasto* (*Ser. XVII*) No. 42, 1955. pp. 61. [Fi.sw.e.]

2323. Statistiques 1954. Agriculture, forêt, élevages, pêche et pisciculture. **[Land production statistics 1953 and 1954 for the Belgian Congo and Ruanda-Urundi.]** *Bull. agric. Congo belge* 46 (4), 1955 (985 + 10 tbls.) [F.]

Ten forms giving statistics of production, table F giving that for forestry in the Congo (logs, converted timber, veneer, plywood, fuel, charcoal and pitwood) and table J giving a general note on forest production and areas in Ruanda-Urundi.

2324. **Forest and shelterbelt planting in the United States during 1954 (July 1, 1953—June 30, 1954).** *Supervision Reports Annual Planting, U.S. Forest Service 1954,* [1955]. pp. 4 + 5 tbls.

Statistics of acres planted on (1) federal, (2) state, and (3) private land, and planting stock distributed by state and federal agencies.

2325. **Forests of Louisiana, 1953–54.** *For. Surv. Release Sth. For. Exp. Sta.* No. 75, 1955. pp. ii + 64.

2326. STERNITZKE, H. S. **Tennessee's timber economy.** *For. Resour. Rep. U.S. For. Serv.* No. 9, 1955. pp. 56 + map. 8 refs. Price 55 cents.

2327. ZASADA, Z. A., HEINSELMAN, M. L., and VOIGT, G. K. **Potential productivity of forest lands in Pine, Carlton, Aitkin and Southern St. Louis counties, Minnesota.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 30, 1954. pp. 53. 13 refs.

Discusses results of a survey of the area, and the management of existing good-quality forests, the improvement of Aspen stands and the afforestation of swamp and upland sites.

2328. OUDIN, A. Importance et rôle du châtaignier en France. **[Importance and role of the Chestnut in France.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/17-C*, 1955. pp. 8. [F.] Limited distribution.

2329. GONZALEZ VAZQUEZ, E. Papel económico social del castaño en España. **[The social-economic aspect of Chestnut in Spain.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/17-A*, 1955. pp. 3. [Span.] Limited distribution.

Gives figures for area and production of Chestnut stands by provinces.

2330. FERNANDES, C. Le rôle du châtaignier dans les régions nommées 'Terra Fria' dans le nord-est du Portugal. **[The role of the Chestnut in the 'Terra Fria' regions of N.E. Portugal.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/17-E*, 1955. pp. 10. 6 refs. [F.] Limited distribution.

2331. Le châtaignier en Yougoslavie. **[The Chestnut in Jugoslavia.]** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/17-F*, 1955. pp. 3. [F.] Limited distribution.

2332. KAJIURA, M. **Importance and rôle of Chestnut in Japan.** [*Pap.*] *3e Sess. FAO Comm. int. Chât., Rome 1955* No. *FAO/CH/17-B*, 1955. pp. 13. Limited distribution.

Gives summary information on area, varieties cultivated, production of nuts and timber, diseases and insect pests, and breeding projects.

907. Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)

See section 116 and No. 1600.

908. Relationship to Other Branches of Husbandry and Industry

2333. RIEBEN, E. Le forestier en face des problèmes d'économie pastorale. **[The forester faced with the problems of pastoral economy.]** *Schweiz. Z. Forstw.* 106 (1), 1955 (1–32). 26 refs. [F.f.g.]

Discusses the problems of combining forestry and pastoral husbandry in the Swiss Alps, and makes suggestions for easing the situation, e.g. improvement of pastures, planting in the form of shelterbelts, improvement of communications, and rational management of grazing.

2334. MARTINI, M. DE. L'economia del Monte Amiata. **[The economy of the Monte Amiata region.]** *Ital. for. mont.* 10 (5), 1955 (191–212 + 8 photos, 1 map). [It.it.f.]

This region of Tuscany, comprising more than 1000 sq. km. of worn-out agricultural land, devastated forest, and exhausted mines, was designated in 1952 a 'pilot zone' for experiments in state-aided works of rehabilitation (afforestation, torrent training, improvement of pastures, regulation of grazing, rationalization of agriculture). The author surveys the original condition of the zone and the results so far obtained.

91. Land Use, Land-Use Policy (Including Afforestation Policy)

See also Nos. 2305, 2307, 2324, 2333–4.

2335. THIRAVAT, S. **[Preventive measure against the practice of shifting cultivation by hill tribes.]** *Vanasarn* 11 (3), 1953 (43–54). [Siam.]

A short account of the practice, which is largely confined to the hills in the N. and especially the N.W. of the country. Cropping is generally for one year only and on a subsistence basis except for opium, the attempted suppression of which by the forest authorities has driven the main body of hillmen to the remoter hills of the northwest (Tark). Control measures are discussed, the author favouring the recently introduced policy of persuasion, by means of demonstration plots showing the superior value of (permanent) crops more suited to the northern hill climate, e.g. Yarng oil, tea, coffee and cocoa.

2336. HESKE, F. Die Erschliessung der Steppe. Gedanken zu einem Nationalplan der Walderhaltung, Dürrebekämpfung und Innenkolonisation in der Türkei. **[Possibilities of using the steppe: thoughts on a national plan for forest protection, drought control and planning of resettlement in Turkey.]** *Istanbul Üniv. Yay.* No. 536 (*Orm. Fak.* No. 23), 1953. pp. 202 + 66 photos. 313 refs. [G.]

A German version of a work already published in Turkish in 1952.

2337. HESKE, F. Wald und Boden in Liberia. (Ein Beitrag zur tropischen Bodenbenutzung.) **[Forest and soil in Liberia. (A contribution to tropical land use).]** *Z. Weltforstw.* 18 (2), 1955 (41–9). 4 refs. [G.e.]

Describes briefly the country's climatic and vegetation zones and, in more detail, soil classification and land use. The author dwells in particular on the practice of shifting cultivation, common over 40% of the country and involving ca. 270,000 ha. annually on an 8- to 15-year cycle. To preserve soil fertility (with a stress on structure) in tropical Africa, the author recommends conservation of wide areas under forest, introduction of mixed husbandry where population pressure dangerously reduces the fallow periods of shifting cultivation, and the concentration on tree plantation crops for cash crops.

2338. TONDEUR, G. Le paysannat indigène dans le programme de la M.A.E. [Mission antiérosive]. **[The native small-holding in the programme of the Anti-erosion Mission.]** *Bull. agric. Congo belge* 46 (4), 1955 (853–92). [F.flem.]

A detailed description, with illustrations and statistics, of the results to date in 3 pilot schemes for planned land use in Kivu in over-populated and over-stocked areas where the terrain prevents a rectangular lay-out. Slopes > 45% are allocated to forestry; of 25–45% to paddocked pasture; of 0–25% to fields, those > 5% being protected by anti-erosion hedges.

2339. ALLEN, S. W. **Conserving natural resources: principles and practice in a democracy.** McGraw-Hill Book Co., Inc., New York. 1955. pp. ix + 347. 115 refs. Price $6·00 (£2. 1*s.* 6*d.*).

Includes chapters on: the land, the soil, and conservation; water; forests, grazing, and recreation; wild-animal resources; mineral resources; human powers as natural resources; all with reference to the U.S.A.

2340. RAY, H. C., and LAWSON, M. **Site characteristics as a guide to forest and grazing use in the Ozarks.** *Journal of Range Management, Portland* 8 (2), 1955 (69–73). 8 refs. [Soil Conservation Service, Fayetteville, Ark.] A.P.B.

Owing largely to diminished burning, forest growth, much of it stunted, has spread considerably in historical times, both in the Ozark and in the Cuachita Highlands (calcareous and dolomite formations, and sandstone and shale, respectively). From the analysis of 1018 random plots, soils were divided into 9 groups, for which their predominant vegetation and their mean site indexes for *Quercus alba, Q. stellata, Q. borealis, Q. falcata* and *Pinus echinata* were ascertained. Soil groups 7–9, all with deep, medium-textured, slowly or moderately permeable soils, were suitable for forest, while the shallow, or stony sites, and very slowly or freely permeable deep soils were more suited to range use.

2341. KENNEDY, D. **The rôle of forestry in the land-use pattern of the west coast [of New Zealand, South Island.]** *N.Z. J. For.* 7 (1), 1954 (1955), (11–22). 3 refs.

A paper read at the 8th N.Z. Science Congress, Auckland, 1954.

2342. CHAVASSE, C. G. R. **Potentialities for indigenous and exotic forestry in Westland.** *N.Z. J. For.* 7 (1), 1954 (1955), (34–49). 5 refs.

A discussion of land use, concluding that the large areas of waste, cut-over land in this part of South Island, are primarily suited to forestry and should continue to be devoted to it, in preference to agriculture.

92. Forest Ownership and Ownership Policy

See also Nos. 1882, 2345.

2343. THONGKAM, S. **[A step towards communal forest.]** *Vanasarn* 11 (3), 1953 (71–80). [Siam.e.]

The author, provincial forest officer for Xachoeng Sao Province, describes his pioneer attempt (which has official backing) to establish a communal forest and so inculcate forest-mindedness in the local population. A good piece of forest [extent not stated] in Koh Kanoon district was demarcated (1953), under the Forest Protection Act of 1938 and handed over to the charge of 3 adjacent villages through a board of management consisting of their 3 headmen and the district civil officer. It is planned to get the villagers to clean, thin and tend the forest in June each year under the guidance of the local forest staff.

2344. **Small woods.** [*Docum.*] *8th Sess. FAO European For. Comm., Rome 1955* Nos. *FAO/EFC/84-A* to *N*, 1955. [E. or F.] Limited distribution.

Reports for Austria (pp. 7), Netherlands (pp. 8), France (pp. 20), Denmark (pp. 9), Norway (pp. 2), Luxembourg (pp. 4), Ireland (pp. 2), W. Germany (pp. 7), Finland (pp. 6), Spain (pp. 2), Jugoslavia (pp. 4), Portugal (pp. 5), Great Britain (pp. 15), and Sweden (pp. 6).

93. Public Supervision and Regulation of Forestry, Including Legislation for these Purposes

See also No. 2310.

2345. **[Land acquisition for state afforestation in Eire.]** *Timb. Tr. J.* 215 (4133), 1955 (93).

The new forestry bill aims at removing difficulties (*a*) as regards defective title (common), and (*b*) where grazing rights are shared and a single objector can at present ban acquisition, so excluding extensive areas of suitable planting land. For (*a*) the rights of possible claimants are to be guarded for 6 years and for (*b*) the Land Commission will be authorized to reallocate grazing land to objectors and to free the rest.

2346. FRASSOLDATI, C. Il pascolo abusivo nella legislazione forestale. **[Abusive grazing in [Italian] forest legislation.]** *Ital. for. mont.* 10 (5), 1955 (213–5). [It.it.f.]

Examines the penal sanctions prescribed for abusive grazing in different articles of the Italian penal code.

2347. **[The royal decree of 1954 declaring various kinds of minor forest produce reserved.]** *Vanasarn* 12 (4), 1954 (69–73). [Siam.]

Reproduces the decree, which lists by provinces the items that may not be collected without a permit (i.e. are reserved to the Government), e.g. dammar, resin, Yarng oil, varnish lacquer, honey, bamboo, canes and palm leaves, charcoal and 3 species of orchid. [Cf. *For. Abstr.* 17 (No. 2318).]

94. Other Methods to Implement Forest Policy

944. Co-operation. Collaboration of Forest Owners

See No. 2315.

945.2. Publicity, Propaganda (including Demonstration Forests)

2348. **Greening movement in Japan.** Forestry Agency, Tokyo. [*Docum.*] *3rd Sess. FAO Asia*

Pacif. For. Comm. 1955 No. *FAO/APFC* 55/42, 1955. pp. 16.

Report on the campaign to encourage tree planting in Japan, school forests, and bird protection.

2349. **[Recent activities in the Tokyo University forests.]** *Misc. Inform. Tokyo Univ. For.* No. 10, 1955 (87–139 + 1 plate). 6 refs. [Jap.]

A report on forest activities in various Tokyo University forests—Chiba, Hokkaido, Chichibu, Aichi and Fuji, and the Silvicultural Research Station at Shizuoka, during the past 3 to 9 years. Items include, for Hokkaido, lists of exotic tree species in the arboretum, tree seed and cuttings exchanged with Sweden and seed sent from U.S.A., and 241 exotic species (in greenhouse and garden) at the Shizuoka Research Station.

945.3. Education. Training

2350. FRIEDRICH, A. G. Reichsinstitut für das Forstwesen der Universität Oxford. **[Imperial Forestry Institute, University of Oxford.]** *Z. Weltforstw.* 18 (2), 1955 (60–1). 5 refs. [G.]

A note on its history, staff, research, and courses, mentioning also the Commonwealth Forestry Bureau.

2351. Zur Jahrhundertfeier der Eidgenössischen Technischen Hochschule. **[The hundredth anniversary of the Swiss School of Forestry.]** *Schweiz. Z. Forstw.* 106 (9/10), 1955. [G.f. or F.g.]

A special number consisting largely of articles describing the teaching and research carried out since the foundation of the school.

2352. **Data of forestry education under the jurisdiction of Ministry of Education [Japan].** [*Docum.*] *3rd Sess. FAO Asia-Pacif. For. Comm., Tokyo* No. *FAO/APFC*-55/60, 1955. pp. 21.

Includes tabulated data on Japanese universities that give forestry courses, and conditions on which foreign students are allowed to study.

945.4. Research

See also Nos. 1903, 2301, 2350–1.

2353. **Forest research [in Japan].** Forestry Agency, Ministry of Agriculture, Tokyo. 1955. pp. [22]. [E.]

An illustrated account of Government and prefectural organizations and their work.

2354. KALNINJŠ, A. I. Problemy lesnogo hozjaïstva i lesohimii: iz opyta raboty Instituta Lesohozjaïstvennyh Problem Akademii Nauk Latviïskoï SSR. **[Problems of forestry and forest chemistry: notes on research at the Forest Research Institute of the Latvian Academy of Sciences.]** *Priroda, Moskva* 44 (8), 1955 (57–62). [Russ.] A.P.B.

A brief account in very general terms. Work has included: use of fertilizers to improve seed production; vegetative propagation; afforestation of poor sands with Willow, Scots and Mountain Pine and Alder; development of a self-propelled generator to serve 2–3 electric saws in selective felling; wood hydrolysis; furfural derivatives; steam distillation of resin; dry distillation; drying; preservation; chipboard manufacture; and foliage from slash as a source of vitamins.

2355. **List of publications of the Forest Research Institute and Colleges published up to 31st May, 1954.** Forest Research Institute, Dehra Dun. 1955. pp. 33.

2356. **Research programme [Forest Research Institute, Kepong]: Progress report 1954.** *Res. Pamphl. For. Res. Inst., Kepong* No. 15*A*, 1955. pp. 72.

2357. BELTRÁN, E. Los recursos naturales de México. I. Estado actual de las investigaciones forestales. **[The natural resources of Mexico. I. Present situation in forestry research.]** Instituto Mexicano de Recursos Naturales Renovables, Mexico. 1955. pp. vi + 125. Many refs. [Span.]

Presents information concerning the history and organization of forestry research in Mexico with a review of past achievements in forest botany, ecology, silviculture, protection, mensuration, forest economy, administration, logging, and forest products, discusses gaps in the field covered and makes some proposals for the future. A comprehensive bibliography is included.

2358. **Publications of the Southern Forest Experiment Station, July 1921 through December 1954.** *Occ. Pap. Sth. For. Exp. Sta.* No. 108 (rev.) 1955. pp. 128.

A classified list with an author index, revising the 1951 edition.

946.1. Associations, Societies

See No. 1233.

95. Forest Taxation

2359. KENT, H. D. **Effects on forestry of the property tax in the Esquimalt and Nanaimo Railway belt.** *B.C. Lumberm.* 39 (10), 1955 (26 . . . 30). 7 refs.

[Cf. *For. Abstr.* 13 (Nos. 3542–3).] An essay, based on a study of 2 million acres of property in Vancouver Island, covering methods of assessment, classification of land and effect on forest management. Tables for the assessment of site value from stump diameter and internode lengths (regeneration), land value based on site and accessibility and for the appraisal of immature timber, are included. Without materially reducing revenue from the property tax, which actually discourages sustained yield management, Government could reverse its effects either by assessing only on bare land values (neglecting crop increment value accretion) or by reducing the 1·5% rate on timberland to the agricultural land rate of 0·5%.

96. Forest Labour Questions. Labour Questions in Wood Transport and the Wood Industries

See also No. 2315.

2360. VÄÄNÄNEN, S. Ammattimaisten metsätyömiesten asunto-olot. **[Housing conditions of professional forest workers in Finland.]** *Repr.* from *Acta for. fenn.* 63 (5), 1955. pp. 32. 19 refs. [Fi.e.]

97. International Forest Policy and Other International Collaboration

971. Congresses, Conferences

See also No. 2307.

2361. **Final report of the Near East Forestry Commission, 1st Session.** [*Docum.*] *1st Sess. FAO Near East For. Comm., Teheran 1955* No. *FAO/NEFC/20*, 1955. pp. 15. Limited distribution.

After examining the national progress reports, the Commission concluded that the protection, rehabilitation, and development of national forests in the Near East is hampered especially by the following obstacles: (1) inadequacy of existing laws (*a*) for the settlement of disputed ownership, (*b*) for supervision of private forests; (2) lack of a clear policy on segregation of forest from agricultural land; (3) inadequate knowledge of the extent of rights of user enjoyed by villages, tribes, or individuals in respect of forest produce and grazing; (4) insufficient and inadequate staffing of forest administrations; (5) inadequacy of research institutions; (6) inadequate machinery for forestry propaganda. The Commission therefore invited Member Governments to take the measures necessary to overcome the obstacles mentioned above, and requested the Director General of FAO: (i) to organize, as soon as possible, a training centre for forest administration, with particular emphasis on methods of controlling rights of user, for the benefit of Near Eastern Governments; (ii) to prepare a pamphlet on the principles of forest conservation applicable to the conditions prevailing in the Near East. Other subjects discussed were the setting up of a regional forestry school, regulation of forest grazing, rationalization of exploitation, and substitution of liquid fuels for wood and charcoal. FAO were also recommended to undertake a systematic study of Acacias (identification, silvicultural characters, value as fodder etc.), in view of their importance in the vegetation of arid and semi-arid areas of the Near East.

972. Organizations

2362. **The work of FAO 1954–55: Report of the Director-General.** FAO, Rome. No. *C55/8*, 1955. pp. 123.

This annual report is somewhat fuller than usual, in view of the impending FAO Conference.

2363. **Activities of FAO under the Expanded Technical Assistance Program 1954–55.** FAO, Rome. 1955. pp. 99 + 13 photos.

A semi-popular account, under the heads of agriculture, economics, fisheries, forestry, nutrition, and regional projects and training centres.

FORESTRY THE WORLD OVER

References: 1. *American Forests*, Washington; 2. *Bois et Scieries*, Paris; 3. *British Columbia Lumberman*, Vancouver; 4. *Chêne-Liège*, Constantine; 5. *Commonwealth Survey*, London; 6. *Comptes Rendus de l'Académie d'Agriculture de France*, Paris; 7. *Finnish Paper and Timber*, Helsinki; 8. *Holz-Zentralblatt*, Stuttgart; 9. *India News*, London; 10. *Indian Forester*, Dehra Dun; 11. *I.U.P.N. Bulletin*, Brussels; 12. *Journal of Forestry*, Washington; 13. *Lumberman*, Seattle; 14. *Nature*, London; 15. *New Hungary*, London; 16. *Press Release, Forestry Branch*, Ottawa; 17. *Quarterly Journal of Forestry*, London; 18. *Scottish Forestry*, Edinburgh; 19. *Southern Lumberman*, Nashville, Tenn.; 20. *Timber Trades Journal*, London; 21. *Timberman*, Portland, Ore.; 22. *Times*, London; 23. *Wood*, London.

International.

FAO Conferences.

1956

September.	Regional Latin-American Poplar Conference.	Argentina
17–30 Oct.	World Eucalyptus Conference.	Rome

1957

January.	Asia-Pacific Forestry Commission 4th Session.	Indonesia
,,	International Conference on Fibre and Particle Boards.	Geneva
March or May.	Near East Forestry Commission 2nd Session.	Iraq
April or May.	European Forestry Commission 9th Session.	(Undetermined)
June.	Latin-American Forestry Commission 6th Session.	,, ,,
Undetermined.	World Poplar Conference.	

Other Conferences.

1956

The study of tropical vegetation formed the subject of an international symposium held in Ceylon at the University of Colombo, 19–21 March, under the auspices of Unesco. Subsequently a committee of 12 research workers were to examine specific activities in the field of humid-tropics research. Among the projects proposed are the production of maps, the classification of vegetation, the organization of a zoological survey of Ceylon, and the establishment of an advisory committee for humid-tropics research (**14**; 10.3.56).

A symposium on vegetable tannins, organized by the Society of Leather Trades' Chemists, will be held at Cambridge, 12–13 April (**14**; 4.2.56).

7–14 July.	IUFRO Congress.	Oxford
10–18 October.	UNESCO Advisory Committee on Arid Zone Research and Symposium on Micro-Climatology.	Australia

1957

A conference will be held in 1957, under the auspices of I.L.O., on the social conditions of Forest Workers.

4–9 June.	11th International Seed-Testing Convention.	Paris
20–28 June.	5th General Assembly of the International Union for the Protection of Nature.	Edinburgh
26 Aug.–10 Oct.	British Commonwealth Forestry Conference.	Australia and New Zealand
November.	7th International Grassland Conference.	Palmerston, N.Z.

1958

	9th International Botanical Congress.	Montreal

Australia. A new material called Tetra, processed from the bark of Paperbark [*Melaleuca leucadendron*] is being manufactured in New South Wales. It is non-inflammable, aseptic, washable, buoyant, and resistant to long exposure to heat or water. All available supplies are at present being used in Australia, principally as a filling for baby pillows, bedding, cushions etc. The dust and other residues are being used as insulating material (**10**; Nov. 1955).

Finland. The new 'Veikko 1' barking machine for use in the forest or at intermediate storage sites is a one-man machine mounted on pneumatic rubber tyres. With its air-cooled petrol engine (2½–4 h.p.), it weighs 200 kg. It barks pulpwood 1½–16 in. in diam. and 1m. long at the rate of 15–20 stacked cu.m./8 hr. The degree of barking can be adjusted, a different attachment being used for completely clean barking (**7**; Nov. 1955).

France. In an attempt to preserve an avenue of ancient Planes on the shores of Lake Annecy, the soil was loosened and aerated by the use of explosives, and fertilizers were introduced into the holes thus made. Underground irrigation was also tried, and branches attacked by *Gloeosporium nervisequum* were pruned. These measures seem to have prolonged the life of some of the trees, but some will have to be replaced (**6**; Oct. 1955).

A new church, built almost entirely of wood, was consecrated in July at Sembadel, Haute-Loire. The building was carried out by local workers, the wood all having been cut and shaped beforehand in the sawmill. Building was done in the winter, when work is short, and use was made of short lengths of timber easy for inexperienced workers to handle. The undertaking was organized by a committee including local timber-merchants and sawmillers, and the timber all came from neighbouring forests. The church is dedicated to Our Lady of the Forest (**2**; 5.1.56).

Great Britain. The New Forest Verderers have rejected the Forestry Commission's application for authority to enclose almost 5000 acres of the open forest for timber growing. The Deputy Surveyor had selected 37 areas, ranging from 8 to 475 acres, for the proposed plantations. The plan is strongly opposed by the commoners, who alleged that further enclosures for afforestation would detract from the value of their rights and privileges and those of the general public. They argued also that the enclosures would increase the risks attendant on their cattle and ponies going on the roads (**22**; 3.1.56).

It now seems that Scotland will shortly have her own forest tree seed certification scheme, and thus be the first U.K. country to operate such a scheme. Under its constitution, the Scottish Forest Tree Seed Association, membership of which is voluntary, will have as its object: "To improve the quality of all species of forest trees grown in Scotland, by encouraging in all possible ways the use of seed and plants of the best known origins." Some of the proposed activities of the Association are: the classification and registration of trees, woods, and plantations as approved seed sources; preparation of a register of approved seed stores, extraction plants and testing facilities; preparation of a register of suppliers of certified seed and plants; the issue of certificates of origin for seed and plants produced from approved sources (**18**; Jan. 1956).

The Timber Development Association has moved its technical laboratories from London to more spacious quarters at Tyler's Green near High Wycombe, and is to expand its research programme. This will supplement the fundamental studies carried out at the Forest Products Research Laboratory, Princes Risborough. Investigations will be concerned less with wood as a material than with its uses in selected fields of industry, with special regard to design, production, and processing. The new laboratory accommodation affords excellent facilities. The installations will include a mechanical-test bed which can be set up to subject timber girders and trusses up to 100 ft. long to the most vigorous loading stresses. Land adjacent to the laboratory will be used as an open proving ground for structures, fencing, and timbers used for the exterior cladding of houses. Here the architect and engineer will be able to inspect full-scale structures of advanced design, some of them undergoing test (**17**; Jan. 1956).

At a press conference held in London on 26 January, 1956, the incorporation, aims, and composition of the Institute of Wood Science was announced. The main object is to advance the scientific, technical, and practical knowledge of wood, and the issue of a journal is contemplated. It is intended that the Institute shall ultimately become the examining body in at least the senior examinations in the subject (**20**; 4.2.56).

Hungary. A new sawmill under construction at Szombathely will have automatic air-conditioning in the workshops. All heavy work will be mechanized, and sawdust will be extracted automatically (**15**; Jan. 1956).

India. An expert committee, with Professor H. G. Champion, Professor of Forestry at Oxford University, has been appointed by the Government of India to review the working of the Forest Research Institute and Colleges at Dehra Dun. The committee will review the progress of research during the past 5 years, study the organization of the Institute, and suggest improvements in the quality of research (**9**; 10.3.56).

Japan. Yaku-Shima, an isolated island ca. 37 miles off the island of Kyushu, with an area of ca. 190 sq. miles, is famed for the forests that cover its steep mountains. An outstanding feature of the island is the *Cryptomeria japonica* trees that are found there, both because of their size (up to 16·5 ft. in diam. and 117 ft. high) and their age, which is estimated to be between 1000 and 3000 years. At one time there seems to have been a mysterious gap in the species' ecology, as no trees are to be found between 400 and 800 years old. There is at present disagreement between the Forestry Agency of The Ministry of Agriculture and the National Park Division of the Ministry of Welfare, the latter of which wishes to designate the island a National Park (**11**; Dec. 1955).

New Zealand. The first commercial newsprint in New Zealand was made at the Tasman Pulp and Paper Co.'s mill at Kawerau on 29 October, 1955. The company was formed to utilize timber from the Kaingaroa State Forest. New Zealand Forest Products Ltd. has announced its intention to spend £7–8 million on expansion in the next 5 years. The aim is to increase production of kraft paper from 24,000 to 30,000 tons/year, and pulp production from 50,000 to 100,000 tons/year. The company owns and operates 176,000 acres of forest (**5**; 27.12.55).

Nigeria. African Timber and Plywood Ltd. is establishing a timber research unit at Sapele, which will be the only private research organization in British West Africa. Investigations will cover the treatment of logs from the moment of felling. Construction began in 1954 and is approaching completion. The unit will comprise a completely equipped laboratory and many woodworking machines, which together form a plant that can perform on a small scale all the operations of the mass-producing factory, thus enabling detailed pilot tests to be carried out (**20**; 24.12.55).

Norway. The Minister of Agriculture, in collaboration with the Forest Service, plans to establish some 120 demonstration forests in different parts of Norway, with the object of demonstrating the advantages of methodical forest management and mechanized methods in farm woodlands. It was hoped to establish the first 30 this year (**4**; 1.12.55).

Poland. In a prehistoric fishing village unearthed by a bomb from below a layer of peat near Danzig old harbour, stacks of unbarked round wood were found. The logs (Oak, Spruce, Alder and Ash) had mid-diameters of ca. 18 cm. and lengths of ca. 2m. The timbers had the same appearance, colour and hardness, as normal wood, but slightly less weight (**8**; 29.12.55).

Sweden. Experiments at the Institute of Radiation Physics, Stockholm, appear to show that wooden buildings afford better protection against atomic radiation than buildings of brick or stone (**8**; 14.1.56).

U.S.A. The Governors of the Southern States have endorsed the proposal to hold a conference at New Orleans in April 1956, to discuss forest fires, and particularly the question of arson. The three main objects are stated to be: (1) to inform the public of the seriousness of the forest arson problem and its effect on the economy of the South; (2) to rouse public opinion against all those responsible for starting wildfires and to brand arson as a crime; (3) to stimulate action at State level to eradicate the wildfire menace as soon as possible (**1**; Dec. 1955).

During 18 days at the end of August and beginning of September 1955, forest fires burned 307,000 acres in California. Losses of merchantable timber are estimated at 1250 million bd. ft., which represents about one-fourth of California's annual lumber production, and is valued at more than $100,000,000. Plans are in hand for salvaging as much of the burned timber as possible, but seedlings and young trees were killed outright on more than 125,000 acres. The damage to watershed protection is immeasurable. In addition, losses of houses, other buildings, equipment etc. are assessed at $3,800,000. Of the 436 separate fires involved, 59 were caused by lightning, but the rest were man-made, and 9 out of 10 were suppressed before reaching 300 acres in size. At the peak of the outbreak, on 10 September, more than 14,000 men, 550 bulldozers, and 3000 vehicles were on the fire lines. The state and federal agencies spent more than $3,500,000 of emergency funds in fighting the fires (**12**; Dec. 1955).

The South Carolina Insurance Company is offering fire insurance for merchantable live trees (applying broadly to old-growth stands) and for non-merchantable live trees, e.g. young growth on tree farms. The basic rate, 50 cents/$100 insured value, varies with local conditions, deductions being made for trees of large diameter, Redwood, light undergrowth etc. and additions for the presence of railways or public highways, thick undergrowth, recreational facilities, or lack of protection (**13**; Nov. 1955).

The Pacific Northwest Forest Pest Action Committee has recommended that no spraying for Spruce budworm be carried out in 1956. A 7-year programme of aerial spraying has reduced heavy infestations from a total of 2,760,000 acres in 1949 to 40,000 acres in 1955. It is believed that natural control factors are now able to hold the budworm in check (**12**; Jan. 1956).

Laminated arches of 2-in. Southern Pine timber, with a clear span of 247 ft., a height of 80 ft., and a cross-section of 20 in. at the crown, 25 in. at base, and 46 in. at the point of maximum stress, were used in building a 'sports palace' at West Palm Beach. The use of three splice joints of novel construction made it possible to manufacture each arch in four pieces so that it could be transported to the site without difficulty (**19**; 1.12.55).

A new fibre board, 'Diffusion Board', developed at the U.S. Forest Products Laboratory, Madison, is being tested by the army. It contains secret chemicals that filter out poison gas, disease-laden particles and radioactive fall-out from atomic explosions while allowing oxygen and CO_2 to pass through. It can be manufactured with equipment similar to that for ordinary fibre boards, and from any species of wood (**21**; Dec. 1955).

A tractor-planter equipped with a Lowther V Crush blade with stinger bit was used for the first time to replant 400 acres at Crandon, Wis. The blade pushed aside the heavy undergrowth and levelled the sod, while the stinger bit at the point of the V on the blade dug a narrow trench in which the transplants were placed (**19**; 1.1.56).

The Milton Timber Corp., Weston, Ore., has now in operation a lift truck capable of handling in one bite a complete railcar (28-ton) load of logs. This is the 'Letourneau electric log stacker' with 10-foot forks and power-operated clamping tusks that lift the load clear of the car whence the machine carries it to pond, deck, or cutting table. Electric power generated by a diesel engine operates, through separate motors, each wheel, the fork lift, boom tilt and tusks, with control confined to a simplified switch panel. The machine is produced by Letourneau Inc., Longview, Texas (**3**; Dec. 1955).

The Western Pine Association has conducted experiments with closed-circuit television, setting one unit above the end of the carriage track with a cross-hair on the saw-line, and the other in the sawyer's pit. The sawyer then sees the log and can set it parallel to the saw-line (**19**; 1.1.56).

The American Chance Vought Aircraft Company has made a 6-bladed laminated wood propeller for use in a low-speed wind tunnel built for testing their FNU/3 Cutlass, a jet-propelled plane used by the U.S. Navy. The propeller (of Sitka Spruce) is 20 ft. in diameter, the individual blades being hand-carved out of 2×9-ft. laminated blocks. Each block was made up of quarter-sawn planks 6 in. wide and $\frac{5}{8}$ in. thick glued together with a 22° change in grain direction between layers. Blade tips are of Balsa wood for easy replacement. An 8×8-ft. streamlined fairing made of plywood directs the airflow round the propeller; it is made of two layers of $\frac{1}{8}$-in. Douglas Fir plywood. The propeller will provide wind speeds up to 200 m.p.h. to check landing and take-off characteristics of aircraft and guided missiles (**23**; Jan. 1956).

U.S.S.R. On the area to be submerged by the projected Angara reservoir at the outlet of Lake Baikal, ca. 40 million cu.m. of timber are to be extracted at great speed, using day-and-night shifts of loggers. The power generated by the large-scale electricity works to be erected will be used largely for the development of wood-using industries. A sawmill with 32 frame saws and a capacity of 2 million cu.m. is among the factories and plants scheduled for completion in the coming five-year period (**8**; 1.4.56).

A report on the logging industry during the last 5-year plan (1951–55) states that mechanization of felling had reached 86%, of skidding 74%, of hauling 79% and of loading 60%. Mechanization of bundling and slash clearing was still unsatisfactory, and productivity had not increased proportionately with mechanization. The KT-12 producer-gas tractor is to be replaced by heavy diesel equipment, and electrical saws, which have proved unsatisfactory, by petrol-driven ones (**8**; 28.2.56).